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Immanuel Kant

KANT'S PROLEGOMENA

AND

METAPHYSICAL FOUNDATIONS OF NATURAL SCIENCE.

TRANSLATED FROM THE ORIGINAL,

WITH A BIOGRAPHY AND INTRODUCTION,

BY

ERNEST BELFORT BAX,

AUTHOR OF "JEAN PAUL MARAT: A BIOGRAPHICAL SKETCH," &c.

WITH A PORTRAIT OF KANT

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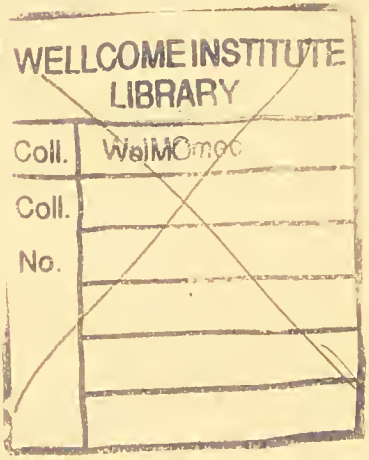

PREFACE.

THE growing interest taken in philosophy in this country has led to the issue of the present volume of "Bohn's Philosophical Library," containing the presentation for the first time to the British public of one work, important alike to the votary of physical science and of philosophy, and an entirely fresh translation of another which is absolutely indispensable at least to the philosophical student of Kant.

Only two English translations of the "Prolegomena" have hitherto been published. The first (a very bad one), by John Richardson, appeared in 1818, and has been out of print for many years past. The second (based on the last-mentioned) forms one of the volumes in Professor Mahaffy's series entitled, "Kant's Critical Philosophy for English Readers," and while avowedly a somewhat free rendering, conveys the sense of the original fairly well, but its relatively high price places it beyond the reach of many persons. The present translation aims at giving, as far as possible, the *ipsissima verba* of Kant. No attempt has been made to convert the cumbrous German of the original into elegant English. Even the form and length of the sentences have been retained wherever possible, as it has been thought preferable to place before the reader Kant himself, with all his lack of literary polish, rather than any mere paraphrase of Kant.

Words not contained in the original are indicated by

square brackets, as a distinction from Kant's own, only too numerous, bracketed clauses. The practice of invariably retaining one particular English equivalent for a German word irrespective of usage has not been adhered to, the same word being variously translated according to circumstances. *Vorstellung* (in a philosophical sense) has been rendered by "presentation," and the pedantic and un-English "cogitate" for *denken*, generally speaking discarded, where the Anglo-Saxon "think" was not available, or would have had a forced look, "conceive" being used instead. Other slight deviations from traditional precedent will be observed by the careful reader.

It may be worth while to mention that Dr. Vaihinger, of Strasburg, has indicated ("Philosophische Monatshefte," XV., pp. 321–332 and 513–532) a remarkable confusion in the paragraphing near the commencement of the Prolegomena. For the conclusive arguments which he adduces in support of his alteration, the reader must be referred to the articles themselves, space only admitting of the result of his investigations being given. This (we quote his own words) is as follows:—"The printer has erroneously introduced the paragraph [p. 18 of present volume] 'The essential feature distinguishing pure mathematical knowledge,' &c., down to the sentence on p. 20, concluding with the words 'make up the essential content of metaphysics,' into § 4, whereas it directly and with strict logic follows the conclusion of § 2, p. 16, 'but by means of an added intuition upon its subject.'" Dr. Vaihinger instances sundry misconceptions that have arisen from what was probably an accidental misplacement in the leaves of the manuscript.*

* The subject of the Prolegomena is also dealt with by Dr. Vaihinger in his invaluable and exhaustive Commentary to the Critique, at pp. 38, 141, 145, 163, 280, 298, 303-4, 318, 335, 340-350, 380, 412, 442, &c., of Vol. I.

The *Prolegomena* were designed by Kant as an abstract of the Critique, the idea being the presentation in a succinct form of the leading positions of the larger work. In this we venture to think Kant was hardly successful. He labours here, as in the Critique, under the disadvantage of the pioneer, that of not fully grasping the import of his own discovery. While in the Critique the really salient points of the system—those which alone furnish a key to the whole—are overlaid by a mass of comparatively unessential superstructure, and instead of being emphasised and expounded in their entirety at the commencement, in most cases have to be discovered and inferred from detached passages and sections scattered throughout the book; in the Prolegomena they seem purposely left in the background. The real cornerstone of the Critique (although Kant did not see it), the deduction of the categories, is omitted altogether.

Kant, in writing the Prolegomena, seems indeed to have had in his mind the same essentially negative view of the scope of his system we find expressed in the note in the *Anfangsgründe* on pp. 144 *et seq.* of present volume. If his object was simply to demolish dogmatic metaphysics, by a limitation of speculation to experience, as its subject-matter, the Prolegomena are admirable, since they are in many respects clearer than the Critique. But if, on the other hand, this negative side of Kant's labours was only a clearing of the ground for the original and constructive portion of his work, the formulation and attempted solution of the problem, "How is experience itself possible?" then we find in the Prolegomena the shortcomings of the Critique in an exaggerated form.

The basis of this latter side of Kant's system, it cannot be too much insisted upon, is the conception of (I.) *consciousness-in-general* or *pure consciousness*, as opposed to the consciousness or experience given directly

through the *individual mind*, the object of empirical psychology; (II.) the *unity of apperception*, which indicates the first moment of the differentiation of *form* from *matter* (an important antithesis that Kant rehabilitated), that is, the first moment of the possibility of consciousness; and (III.) finally the *immanent noumenon* or fundamental *agency* of which consciousness itself with all its *momenta*, is the determination. This last, although tacitly assumed throughout, and frequently referred to in terms of psychology as the "mind," (*das Gemüth*), it was reserved for Kant's successors to definitively fix.

Perhaps the greatest service of Kant is the differentiation of the consciousness-in-general, which is constitutive of *reality*, or in other words, is *pro*ductive of the synthesis of experience, from the psychological consciousness or *mind* of the individual *qua* individual, which is merely *re*productive of this synthesis. This is Kant's great advance upon Berkeley and Hume, who, trained in the psychological school of Locke, failed to distinguish between metaphysics, or theory of knowledge—i.e., the science of the possibility of synthetic or *pro*ductive experience, in other words, of consciousness-in-general—and psychology, the science of the *re*production of this synthesis in the experience of the individual. Berkeley demolished the scholastic substance or material substratum apart from consciousness, but having done so was confronted with the paradox that he had resolved objective *reality* into subjective *ideality*. That this absurdity was only apparent he felt, but was unable to point out where lay the source of the appearance for the reason above stated, namely, his inability to distinguish between consciousness *quâ* consciousness, and its reflection in mind.

The *Metaphysische Anfangsgründe der Naturwissenschaft* has never before appeared in an English form. The same remarks, as regards the aim and character of the

translation, will apply to this work as to the Prolegomena. I must ask, however, for some indulgence in this case for an occasional barbarism (e.g., "a plurality of the real, outside one another,") owing to the difficulty of rendering Kant's meaning adequately in all cases by good English. In the *Anfangsgründe* Kant seems to have surpassed himself in clumsiness and obscurity of style. In several sentences the verb is wanting, and others by the omission of a negative particle or a similar carelessness, make precisely the reverse sense to that, judging by the context, obviously intended.

The treatise in question is of especial interest in relation to modern speculation on the data of physical science, and particularly as to the ultimate constitution of matter, and may be profitably studied in conjunction with such works as Professor Wurtz's, "Atomic Theory," Mr. Stallo's "Concepts of Modern Physics," and Mr. Herbert Spencer's "First Principles." Written in 1786, just one year before the publication of the second edition of the "Critique," it belongs to the maturest period of Kant's philosophical activity. It may be of interest to allude to the fact that since the introductory portion of the present volume was in the press the manuscript treatise of Kant entitled, *Uebergang von den Metaphysischen Anfangsgründe der Naturwissenschaft zur Physik*, "Transition from the Metaphysical Foundations of Natural Science to Physics," has been disinterred and published in the *Altpreussische Monatshefte* for the year 1882. It should be added that the edition used, both in the case of the *Prolegomena* and the *Anfangsgründe*, is that of the collected works by Kirchmann, which, although not without flaw, is probably on the whole the most accurate we possess.

A short biographical sketch of Kant has been supplied by way of introduction to the volume. This is founded chiefly on the old sources, Wasianski, Borowski, Jach-

mann, Reicke. Schubert, &c. The biography is supplemented by a chapter dealing with Kant's position in the evolution of thought, which, although necessarily to a large extent a mere bald outline, it has been thought might possibly prove suggestive to students, and stimulative to independent research in some of the directions indicated.

LIST OF CONTENTS.

	PAGE
A BIOGRAPHY OF KANT	xi
KANT'S POSITION IN PHILOSOPHY	lxxii
THE PROLEGOMENA	1
THE METAPHYSICAL FOUNDATION OF SCIENCE	135

ERRATA.

Page 164, *for* "Pronuce" *read* "Produce"
„ 171, 173, 175, (heading) *for* "Dynanics" *read* "Dynamics"
„ 179, *for* "Cases" *read* "Distance"
„ *for* "Deduciable" *read* "Deducibly"
„ 10, sixth line from top, delete "*a*"

A BIOGRAPHY OF KANT

WITH SOME REMARKS ON HIS POSITION IN PHILOSOPHY.

A BIOGRAPHY OF KANT

WITH SOME REMARKS ON HIS POSITION IN PHILOSOPHY.

Before entering upon our biography of Kant, it may be instructive to take a rapid survey of the condition of Königsberg and German society in the early part of the 18th century. Prussia was at this time under the iron rule of Frederick William I. of tall-hussar notoriety. Since the independence of the country had been established, the trade and importance of Königsberg had advanced with rapid strides. Every spring brought a stream of vessels from England, Holland, Russia, Poland, and other countries. The Baltic town was also the centre of such intellectual life and activity as then existed in Prussia. On more than one occasion it had even offered strenuous resistance to the ordinances of the autocratic monarch himself. In this way a strongly-cemented municipal feeling had been formed which affected all classes of citizens. Various causes had contributed to swell the number of the inhabitants of Königsberg. The fact that the elevation of Prussia to a kingdom had been formally proclaimed from there had given it a certain patriotic importance of its own. But what probably more than anything else helped the rapid increase of the city's population, was its having been neutral territory during a long war. The university (founded in 1553) especially benefited by this circumstance. Students

flocked in from various sides, from Poland and the Baltic districts on the one hand, and from Pomerania, Silesia, and East Prussia generally, on the other. Several important municipal schools were, moreover, opened about this time.

The state of general culture in Germany during the first half of the century was very much what the close of the preceding century had left it. The era of modern German literature had not commenced. The seventh-magnitude poets and dramatists whose names are preserved in the pages of Goethe's *Dichtung und Wahrheit* were the oracles of public taste; an array of equally obscure philosophasters dominated the universities, while philosophy, together with all the more solid branches of literature, was conducted in Latin, according to true mediæval fashion. Some few jurists and philologists alone, belonging to this period, attained to a more than ephemeral reputation. Germany had not as yet recovered from the blighting results of the Thirty Years' War, which effectually destroyed the germs of the awakening culture of the Reformation period. But in spite of this unpromising state of affairs, signs of an imminent revival were not wanting. The brilliant and cosmopolitan genius of Leibnitz had prepared the way for the first essentially German philosopher, Christian Wolff. Wolff, besides being the first thinker to write in German, has the credit of having staunchly, and at times to his own cost, adhered to his master's resistance to the claims of authority, as such, and this fact may be set against the intrinsic worthlessness of his philosophy. The most interesting point in connection with Wolff, is, however, his having been the forerunner of Kant. In general literature, towards the middle of the century, a similar revival is noticeable, the glow of dawn before the rising of the sun of Goethe and his congeners. The time

will perhaps be best appreciated in its intellectual aspect when we recall the fact that the popular essayist Thomasius, the precursor of the later *Aufklärung* writers, died as late as 1728, and that he was a main instrument in exploding the belief in witchcraft among the educated classes, and in abolishing the laws directed against it, as well as a determined, and, to a large extent, successful opponent of the practice of judicial torture.

But the most important influence at this period dominant in North Germany, was not so much embodied in literature as in the social life of the people. We refer to the "Pietism" which then reigned, to a greater or less extent, in well-nigh every German home, and which formed such a marked feature in the early life of the subject of the present biographical sketch.

Such were the social conditions of Germany when the worthy saddler, Johann Georg Cant, was carrying on his handicraft in the *Sadlergasse* of Königsberg, learning to labour and to wait for those better days which, alas! he was never destined to see reward his labour. Johann Georg, in fact, though an upright and excellent man, appears to have been more esteemed by his fellow townsmen for his personal character than his saddle-making abilities. In spite of rigid economy, he never compassed more than very "moderate" circumstances, even according to the standard of the German *Kleinbürger*—and he not the *Kleinbürger* of to-day, but of the 18th century—while at times, it seems, he had a difficulty in making the proverbial two ends meet. Though originally of Scotch extraction, the Cant family had been settled for some generations in the Baltic province, at the time of which we speak. It was on November 13th, 1715, that Johann Georg Cant was united, in the cathedral church of the city, to Anna Regina Reuter, if we may judge by the name, a genuine daughter of the Baltic shores. As is not

unusual with persons in the position of the elder Cant, a large family was the issue of this marriage, eleven children in all, four sons and seven daughters. Of these six died in infancy.

Immanuel, the fourth child and third but only surviving son, was born on April 22nd, 1724. His only brother, Johann Heinrich Cant, the youngest child, and eleven years his junior, after passing many years as private tutor in various aristocratic families, ultimately obtained the rectorate of Mitau and afterwards of Rahden, two country districts, the latter of which he held till his death a few years before that of his elder brother. Of the three sisters, Regina Dorothea, Maria Elisabeth, and Catherina Barbara, the eldest died unmarried, while the two younger developed into excellent housewives and mothers of families of the true German *Bürgerin* type, the youngest of all outliving Immanuel. Kant, throughout his life, acted as the benefactor of his relations and their children, who inherited the bulk of his property.

Frau Cant died when her son Immanuel was thirteen years old. It is related that her death was caused by a circumstance aptly illustrating her goodness of heart. A female friend to whom she was much attached, having been deserted by her betrothed, was attacked by a fever induced by mental excitement. Frau Cant, who zealously watched by her bedside, on one occasion endeavoured vainly to induce her to take her medicine, which she refused, even when the spoon containing it was pressed to her lips. As a last resource, her friend, thinking to overcome her repugnance by example, swallowed the mixture herself. No sooner had she done this than she was seized with a nervous horror, intensified by the fancy that she saw on the patient's body symptoms of spotted typhus. She at once gave herself up for lost, fell ill of a similar fever the same day, and in a few days after

expired. Kant, who was devotedly attached to his mother, could never speak of her, even in his later years, without betraying the deepest emotion.

Pietism reigned supreme in the house in the *Sadlergasse*, and Kant's mother was especially addicted to it. Kant spoke of her as possessed of an inward peace and cheerfulness, capable of being disturbed by no outward circumstances. He was fond of relating how, in a trade dispute, in which his father was engaged, and had suffered considerable loss, she would speak with the greatest consideration of the opponent party, and express the most implicit trust in Providence. In later life the impression of his mother seems to have been more vivid than of his father. He would tell how he used to accompany her in long country walks, of her zeal in directing his attention to the various phenomena of Nature, and in offering such explanations as lay within her reach, with their invariable epilogue on the wisdom and goodness of the Creator. It would appear as though Immanuel had been her favourite child. Besides receiving his general instruction in an institution famed for the pietism of its management, and diligently attending the church in connection with it, he had to be present at the prayer meetings of Professor Schultz, his mother's chief spiritual adviser, who pressed these devotional exercises with emphasis on the attention of the "spiritually minded" among his congregation. These meetings led to a more intimate connection with Schultz, which resulted in bringing about the first epoch in the young Immanuel's career. Schultz had been always well disposed towards the Kants, supporting them in various ways; such as sending them firewood in the winter carriage paid, etc. He was also a frequent guest at their house. In this way various occasions for observing the rising abilities of the elder son presented themselves, and in consequence he earnestly advised his being allowed to

devote himself to studious pursuits. This was readily agreed to, his mother joyfully anticipating the realisation of her long cherished wish that he should enter the church. She, however, died under the circumstances narrated, before he had completed his school education.

The irony of fate is certainly in few cases more strikingly manifested than in Kant's. Nurtured in the straitest sect of the orthodox creed of his day, trained doubtless at great sacrifices on the part of his parents that he might become an adequate exponent of that creed, he was yet destined to prove the most tremendous disintegrating force of modern times, springing intellectual mines, causing old creeds and formulas to fall in (so to speak) of their own weight. In Kant, philosophy and science became definitely emancipated from theology. A parallel involuntarily suggests itself between the respective attitudes towards religious beliefs of Kant and his elder contemporary, Voltaire, the one the subject, and the other the friend, of Frederick the Great. In the first we have the type of 19th century, in the second of 18th century thought. Both were alike in the immense range of their culture and interests; both were alike in the revolutionary character of their work. But, besides the difference which, of necessity, distinguishes the mere man of letters from the philosopher in his mode of thought and treatment, they differ as representing two diverse phases of the great intellectual movement of modern times. The attitude of 18th century thought towards current beliefs, where it was not one of ironical servility, was one of direct and uncompromising hostility; in fact, paradoxical as it may sound, we not unfrequently see the two attitudes combined as in the famous 15th and 16th chapters of Gibbon. What is now known as the historical point of view is, of course, conspicuous by its absence. In no writer is this more

noticeable than in the author of the *Dictionnaire Philosophique*. In Kant, on the contrary, may be discerned the germs of the historical method which *explains* rather than *attacks* dogmas, and of the extra-theological (in contradistinction to anti-theological) attitude of modern science, which, wherever possible, ignores points of direct conflict by disregarding dogma as altogether outside its sphere. This later mode of thought, there can be no doubt, had its origin in Kant's distinction of the speculative and practical reason, although adopted by many who would repudiate this distinction. The world of philosophy and science has more and more tended in the 19th century to exclude all direct theological considerations, whether apologetic or polemical, from its pale. There can, we think, be little doubt that the habit of thought inaugurated by the Königsberg thinker, in spite of its reverent attitude towards, at least, the fundamental conceptions of theology, has been an incomparably more potent factor in current disintegration, at least outside the Latin countries, than the direct onslaughts of Voltaire and the French thinkers of the 18th century. The tendency at present is, indeed, to exaggerate the historical method, or at least to draw from it conclusions scarcely warranted. The sense of historic continuity, and of evolution, leads many thinkers to ignore the significance of epoch-making events and sudden changes, or of voluntarily-directed action in human affairs.

But to return to our young schoolboy, as yet in ignorance of the destiny the fates had in store for him, and anticipating, in all probability, as the farthest goal of his studies no more than the *Pfarrerthum* of some country town or village. Kant was never largely communicative on the subject of his boyhood, but the couple of stories preserved may as well be reproduced. On one occasion, when on his way to school, he was allured

by some young friends he met, into taking part in a game. This neeessitated his laying down his books on the road. The game ended, he rushed off to make up for lost time and arrived at school just in time to see the elass eommenee, when, to his eonsternation, the faet of his being without books suddenly dawned upon him. With the greatest eomposure he nevertheless confessed to the delinqueney, and submitted to the inevitable punishment. Another time he was erossing a brook on the trunk of a tree whieh had been thrown or had fallen over it. He had only advanced a few steps when it showed alarming symptoms of rolling under his feet. Nothing daunted, our Immanuel fixed his eyes on a point on the opposite side, and, without moving them, dashed straight at it, by this means reaehing *terra firma* in safety.

At Michaelmas 1740, in his seventeenth year, Kant entered the university of his native town as a student in theology, a faculty whieh appears soon to have been relinquished. The immediate oeeasion of this, was that another student had been preferred to a seholarship in the *Domschule* for whieh Kant had been a eandidate. But we may suppose that, even at this early period of his eareer, the foregoing was not the only reason. It may be mentioned that Kant preaehed onee or twice during his theologieal terms in a neighbouring eountry church in aeeordanee with the custom at that time prevalent in Prussia for younger students to try their powers on eountry congregations. Philosophy and mathematies were now ehosen as his subjeets from among the university faculties. The ehief and indeed only permanent bias Kant reeeived from his school period was a fondness for the Latin elassics, which he studied so thoroughly that, years after, he eould reeite long passages from memory. It is possible that he might have seleeted philology as his faculty instead of those aetually ehosen, but

for the fact of its being badly represented in the university at the time. The choice made proved decisive for his whole life. Professor Martin Knutzen, who occupied the chairs of philosophy and mathematics, was a man to stimulate and encourage any latent abilities in the students who attended his lectures, and was, naturally, not long in discerning such in Kant. Kant accordingly obtained every possible assistance in his studies from this academical worthy, who allowed him free access to his own well-stocked library, and introduced him to the works of Newton. Poor Knutzen only lived to see the first result of his praiseworthy endeavours to encourage rising genius, in the shape of Kant's maiden essay entitled, 'Reflections on the just Estimation of living Forces.' In addition to those of Knutzen, Kant attended the lectures of Professor Johann Gottfried Teske on natural science. These two men appear to have been the only teachers in the university whom Kant regarded as having had any material influence in moulding his intellectual character. He spoke of both of them with gratitude and reverence, throughout his whole subsequent life, but made little or no mention of any one else among the professors, although he heard, for some time, Schultz on theology, and Johann Behm on classical literature. Towards the close of his university period, Kant was necessarily confronted with the problem of selecting a *carrière*. After some hesitation, he decided for the academic profession. Even before the completion of his own studies, he found himself compelled to give lessons at a very inadequate remuneration in classics, mathematics, and physical science. Later, he applied for the humble post of under-tutor in one of the schools attached to the university, which, though a position of sheer drudgery, would have at least secured for him the use of the university library. Fortunately for his future, which must have been seriously compromised by a

step entailing the surrender of well-nigh all private study, the vacancy was filled up, probably through influence, by a candidate not likely to feel the loss of it. Just at this time Kant's father died (March 24th, 1746), a circumstance which threw him completely on his own resources. With a heavy heart he found himself compelled to leave Königsberg, and seek a position as private tutor, finishing his preparation for the university post he hoped ultimately to fill, in his leisure time.

The first family into which he entered in his new capacity was that of a country pastor named Andersch. Thence he removed to the family of a landed proprietor, Von Hulsen of Arensdorf, near Mohrungen, subsequently ennobled by Frederick William III., where he remained for some time, giving great satisfaction and permanently attaching himself to his pupils. One of them subsequently resided with him as boarder, after he had become finally settled in Königsberg. Was it owing to Kant's influence and instruction in their early life, that the young Von Hulsens were the first among the Prussian feudal lords to voluntarily emancipate their peasants, ensuring them the right to the produce of the land on which they lived and worked?

Kant's third and last place as tutor was in the family of Count Kayserling of Rautenburg, who however resided most of the year in Königsberg. His wife, the countess, is described as a woman of high culture, and one of the leaders of aristocratic society in the city and its neighbourhood. Kant thus found himself suddenly thrown into the most influential circles of his native town, his genius rapidly placing him in the foremost rank. It was during this time that Kant acquired the high polish of manner and distinguished bearing, for which he was afterwards remarkable among *Gelehrten*. It is not unlikely, also, to have been about this period that he saw fit to change the

initial letter of his name from C to K, a step, it is said, he was led to adopt owing to the perversity of many persons in pronouncing it Tsant. Kant remained nine years in his tutorial capacity, before, owing to the support of a relative named Richter, he was enabled to take his degree in philosophy. One of his examination-essays, *de Igne*, was rewarded by the acknowledgment of his former teacher Teske, that he himself had learnt much from it. Kant received his doctorate on April 17th, 1755, in the presence of a large number of distinguished persons connected with the town and university. During the same term he defended in public debate the principles of his test-essay *Principiorum primorum cognitionis metaphysicæ*, the necessary preliminary to the post of lecturer, or Privat-docent. With the winter term of 1755 he commenced lecturing on mathematics and physics, continuing to do so, for ten years, contemporaneously with his philosophical lectures. The latter were based in principle on Wolff, Baumeister, and Baumgarten, though text-books were chiefly used to furnish an order for the exposition of his own thought. Criticism was, of course, at this stage undreamt of, but the originality of the great thinker moulded with its unmistakable impress even the dogmatic metaphysics of his pre-critical days. His fascinating delivery combined with his rich and varied erudition to procure him a large audience. In the dry and cumbrous language of the 'Critique' and many other of the later works, it is difficult to detect the humorous and versatile lecturer, full of illustrations drawn from every conceivable source, his own experience of life, no less than from history and science, who charmed the students of Königsberg university, before his fame had reached the outside world. The success of the lectures was so great that constant demands were made for additional courses not contained in the original syllabus.

The first great work of Kant's appeared almost at the

commencement of this period of his academical activity. Kant had just received his license as Privat-docent when he published his 'General Natural History and Theory of the Heavens,' one of the most remarkable astronomical works of the century, and which even now may be read with profit. A few months afterwards, the memorable earthquake of Lisbon afforded him the opportunity of exhibiting his research in questions of physical geography. In April 1756, it became necessary for him to undertake another public disputation, as by an ordinance of Frederick the Great three disputations on a printed theme were requisite before a Privat-docent could enter a professorship. To this end he wrote his treatise *De Monadologia physica*. On the successful issue of the ordeal, Kant applied for the post of extraordinary professor of mathematics and metaphysics, for some little time vacant by the death of his old teacher Martin Knutzen. But the government, busy with war-preparations, and anxious to reduce expenditure, decided to leave the post still unoccupied. Two years subsequently the ordinary professorship in the same departments became vacant, and Kant again applied for the position. The Prussian government had in the meantime (it was during the Seven Years' War) handed over the province to the Russians, and the Russian governor-general, Nikolaus von Korff, was chief of both the military and civil executive. Kant had as a competitor a Dr. Buck, who was influential in high places, and in spite of his own good recommendations failed to secure the appointment. Continuing his life as Privat-docent, he extended the range of his departments to "philosophy of religion," anthropology, and physical geography, besides giving special lectures on other subjects. Among Kant's pupils at this time, was Herder who attended the whole of the courses delivered between the years 1762 and 1764. Kant allowed Herder

to attend free of cost, a not insignificant act of generosity when one considers that Kant himself was in circumstances far from "easy" at the time; and we can scarcely absolve the author of the 'Ideen zur Geschichte der Menschheit" from the charge of ingratitude, for having allowed an adverse criticism of his book to be the cause of the bitterness he subsequently displayed. There can be no doubt, that, great as Herder's own genius may have been, he owed an immense debt to Kant. A friend of the former relates how careful he was, in noting down every sentence that fell from the philosopher's lips. Once when Kant had discoursed with a more than usual brilliancy—a brilliancy amounting almost to poetic enthusiasm—Herder was so deeply impressed, that on his return home he embodied the substance of the lecture in verse, and the next day handed the manuscript to Kant before the commencement of the class. The latter was so struck with the masterly poetic presentation of his ideas, that he read the poem through to his audience, before his lecture, with a power and emphasis that well rewarded the author for his pains. Herder, in spite of his subsequent quarrel, was constrained, years after, in his 'Letters on the Improvement of Humanity' (No. 79) to admit the impressiveness and charm of Kant's personality, and his rare combination of humour and eloquence with depth of thought. "The same vigorous intelligence," writes Herder, "with which he tested Leibnitz, Wolff, Baumgarten, Crusius, or Hume and followed out the natural laws established by Newton, Kepler, and other physicists, he brought to bear on Rousseau's 'Emile' and 'Héloïse' &c."

Another noteworthy acquaintance of Kant's at this time (though the relation between them was not that of master and pupil), was Johann Georg Hamann, the well-known classic and humourist. The characters and paths of the

two men were too divergent to admit of anything like a close and lasting friendship. The equable temperament and thoroughness in work of the one, consorted ill with the fitfulness and superficiality of the other. Whether owing to this circumstance or not, it is remarkable that Kant nowhere makes any reference to Hamann, so that, the rooted antipathy of our philosopher to letter-writing preventing any considerable correspondence between them, no evidence (excepting the few letters preserved) remains of their intimacy, if such it was, beyond the testimony of the not too reliable Hamann himself.

But at once the most important and most interesting of all Kant's friendships remains to be told. I give the story of its origin and nature in the words of Jachmann (pp. 77–82). "The nearest and most intimate friend that Kant had in his life, was the English merchant Green, who died twenty years ago, a man whose peculiar value, and whose important influence on our sage, may be learnt from the description of their friendship. A singular accident, that seemed likely to create a deadly hatred between the two men on their first acquaintance, gave occasion to the closest ties." "At the time of the Anglo-North American war,* Kant was walking one afternoon in the Danish Garden. He stopped on finding some acquaintances, who were standing in a retired part, talking with some other persons unknown to him. The conversation, in which all present took part, soon turned upon current events. Kant was warmly advocating the American as being the righteous cause, and expressing himself with some bitterness against the English, when suddenly one of the company, springing forward, presented

* This friendship, as remarked by Schubert, is proved by letters to have begun long previously to the American War of Independence—probably during the early part of the decade 1760–70; so that the conversation quoted in the text must have reference to some earlier phase of the Anglo-American question.

himself before Kant, saying that he was an Englishman, declaring himself and his whole nation outraged by the expressions used, and demanding, at the same time, satisfaction in accordance with the *code d'honneur*. Kant would not allow his equanimity for a moment to be disturbed by the man's vehemence, but continued his remarks, expounding the principles on which he based his political views, and the standpoint from which every man, as citizen of the world, irrespective of his patriotism, ought to judge similar events. This was done with such an irresistible eloquence, that Green—for such was the name of the Englishman—filled with astonishment, offered his hand in a friendly manner, acknowledged the nobleness of Kant's ideas, apologised for his warmth, and after accompanying him in the evening to his house, invited him to a friendly visit. The now deceased merchant Motherby, a partner of Green, was an eye-witness of the occurrence, and has often assured me that Kant seemed to himself and all present, as though inspired by a Divine power, which enchained their hearts for ever to him. Kant and Green thenceforth concluded an intimate friendship, based on knowledge and mutual esteem, a friendship that daily became firmer and closer, and the rupture of which, owing to the early death of Green, occasioned our sage a wound, mitigated indeed by his greatness of soul, but never wholly healed. Kant found in Green a man of wide knowledge, and of so large an understanding, that he himself assured me he never wrote a single sentence in his 'Critique of the Pure Reason,' which he had not previously read to Green, and allowed to be criticised by his unbiassed judgment, unpledged as it was to any system. Green was in character a rare man, distinguished by strict integrity and real generosity, but full of the most strange idiosyncrasies; a truly whimsical man, whose days were passed according to a set of inflexible

and fanciful rules. I will only give one instance of this. Kant had promised Green one evening to accompany him on the following morning at eight o'clock in a drive. Green, who, as was usual on such occasions, was paeing the room with his watch in his hand a quarter of an hour before the time appointed, at ten minutes put on his hat, at five minutes took his stick, and with the first stroke of the hour opened the earriage door and drove off. He encountered Kant, who was two minutes late, on his way, but did not stop, as this was contrary to the arrangement and his rule. In the society of this gifted, noble-minded, and singular man, Kant found so much nourishment for his intellect and his heart, that he became his constant companion, and for many years they daily spent several hours together. Kant went to him every afternoon, found Green sleeping in an armchair, sat down beside him, put aside his thoughts, and fell asleep also. Then bank director Russmann generally arrived and did likewise, till finally Motherby entered the room at an appointed time, and aroused the company, who entertained each other till seven o'clock with conversation. The little coterie broke up so punctually at seven, that I have often heard the inhabitants of the street say 'It can't be seven yet, for professor Kant has not gone past.' On Saturday, the friends, to whom were added on this occasion the Scotch merchant Hay and some others, assembled to supper, consisting of a frugal cold collation. This friendly intercourse, which fell towards the middle of our sage's career, had incontestably a decided influence on his character. Green's death changed Kant's mode of life so much, that from this time forth, he never again entered an evening gathering, and wholly renounced supper himself. It seemed as though this time, once sacred to his most intimate friendship, he wished to pass in solitude, as a sacrifice to his deceased friend, to the close of his existence."

I have given this interesting narrative of Jaehmann at length, as it is eharacteristie in more ways than one of the philosopher's eharaeter and habits.

In July 1762 the profcssorship of poetry had beeome vaeant, but was not filled up for some time, in spite ot numerous applieations, owing to the pre-oeeupation of the ministry with other matters. Meanwhilc Kant's works and news of his sueeess as leeturer had reaehed head-quarters, and resulted in the following ministerial reseript dated, Berlin, the 5th of August, 1764, signed by the minister of justice, and addressed to the government of the provinee of Prussia, to be eonveyed to the senate of the university of Königsberg. "A eertain magister, by name Immanuel Kant, having beeome known to us by writings displaying thorough scholarship, it is desired to know whether the said Immanuel Kant possesses the requisite aequirements in German and Latin poetry, together with the neeessary gifts for teaching the same, and whether he would be inclined to aeeept this post. On this point you are to obtain information, and thereupon to report aeeurately; in the event of the said Immanuel Kant either not possessing the neeessary acquirements for the oeeupation of this post, or being indisposed to its aeeeptance, you are required to bestir yourselves, to propose, in due form, other sufficiently qualified persons." Kant believed himself to have no speeial bent for the professorate in question, whieh would have involved the eriticism of all *pièces d'occasion*, as well as the eomposition of such on academie festivals, so he at onee deelined it, at the same time "reeommending himself" for a more suitable occasion. Another reseript was issued in reply, to the following effeet: "We are none the less most graciously determined to promote the magister, Immanuel Kant, to the use and aeceptance of the said aeademy on another opportunity; and graeiously command you ae-

eordingly, to notify us, in due obedienee, on the manner in whieh this may be most suitably effeeted."

The following year Kant aeeepted the librarianship of the publie library at a salary of sixty-two thalers (£9 6*s.*) a year, this meagre pittanee being the first fixed stipend he obtained from any souree. About the same time, his love for natural seienee led him to undertake the eurator-ship of a valuable private museum of natural history, and ethnographieal objeets. This he found himself eompelled very soon to relinquish, as the eolleetion being one among the eomparatively few "objeets of interest" in the eity, his presence in showing it beeame too mueh in request amongst sightseers. Kant was now living in the house of a bookseller named Kanter, to whose journals the *Königsbergischer wöchentliche Nachrichten* and the *Gelehrte Zeitung*, he regularly eontributed. In the summer of 1768 Kanter opened "new and extensive" premises, ineluding a room apparently serving the purpose of a reading and writing room for his customers, round the walls of whieh were hung the portraits of prominent eontemporary German seholars. Kant was indueed to "sit" for his portrait by his host, who was anxious to add the Königs-berg eelebrity to his eolleetion. The resulting pieture, whieh must have portrayed Kant at the age of fourty-four, is now hanging on the walls of Messrs. Gräfe and Munzer's establishment at Königsberg.

Kant's fame was now no longer confined to his native provinee or eountry, but was rapidly spreading into other parts of Germany. In 1769 he reeeived the offer of the vaeant ehair of logie and metaphysies in the university of Erlangen, a post he seems at first to have been inelined to aeeept, mueh to the satisfaetion of the students of the university. The position was not un-remunerative aeeording to the ideas of the time, eon-sisting of 500 florins salary yearly, in addition to a

liberal supply of fuel for the winter, with an immediate advance of 150 gulden for travelling expenses. The project seems to have been pending for some months, but was eventually abandoned. The same result attended an offer of the professorate at Jena, made in January 1770. Kant had finally determined not to leave his native town, let the allurements be what they might. The time was drawing near when the post which was the goal of his professional hopes was to become once more accessible. In the March of the same year (1770) the professorship of mathematics, becoming vacant, was offered to Kant. Singularly enough, Kant's former successful rival, Professor Buck, had, immediately on learning the death of its late occupant, himself taken steps toward getting nominated for it, in lieu of the post he then occupied. The matter was thus easily adjusted. Buck resigned the chair of logic and metaphysics, while Kant relinquished his claims to that of mathematics. The two men were thus mutually installed in the positions of their choice; the ministerial rescript appointing Kant as ordinary professor of logic and metaphysics in the university of Königsberg, bearing the date of March 31st. The salary was 400 thalers (£60), besides lecture fees. Kant did not formally enter upon his duties till August 20th, 1770, when according to precedent he publicly defended his treatise *De mundo sensibili*, containing the fundamental theses of the 'Critique.' He chose as his respondent, his friend and pupil Dr. Marcus Herz, who a few days later returned to Berlin. With his assumption of the professorial robes commenced the middle period of Kant's academical and literary life, when his system was elaborated and matured, and his powers were at the height of their activity. Henceforth we have the critical Kant before us.

Kant's entry upon his new functions was almost coincident with the assumption of the entire educational

departments of the ministry at Berlin by Baron von Zedlitz, a man of considerable culture and a zealous disciple of the *Aufklärung*, who at once recognised Kant's genius and importance for the university, and remained an influential friend to him until his resignation eighteen years later. Zedlitz was no sooner in office than he issued a rescript proscribing the Crusian philosophy, making a clear sweep of the antiquated text-books previously in use, and generally calculated to put academic bodies "on their mettle." No opportunity was lost of showing ministerial esteem for the occupant of the philosophical chair at Königsberg. In 1778 Professor Meier of Halle dying, Zedlitz immediately offered the appointment (which was of considerably greater pecuniary value than the one at Königsberg) to Kant, and was much surprised at its being declined by him. His anxiety for Kant's worldly prospects was sufficient to induce him to repeat this invitation. "I cannot," he writes, "give up my desire to see you remove to Halle. It is too bad that your way of thinking so exactly coincides with your post. Really, my dear Herr Kant, however praiseworthy this may be in itself, it does not seem to me well that you should so deliberately refuse a better position." This second letter contained every possible argument, even to considerations of climate, but all to no purpose. Kant was inflexible in his resolution to remain true to his native town, by letting it have all the honour and advantages accruing from his genius. That the incident contributed, if anything, to enhance the minister's esteem goes without saying. Departing from his usual practice of not dedicating his works, Kant inscribed the first edition of his 'Critique' to his "protector" Freiherr von Zedlitz. The expression "protector," was in this case no mere form, as Kant found to his cost on the death of the free-thinking Frederick the

Great many years later, and consequent resignation of his minister, which not long after followed, for his successor was a man of very different mould; it was under his administration that Kant, as we shall presently see, was first made to feel the existence of a press censorship.

Throughout the tenure of his office of professor, every morning, summer and winter, during the terms, saw Kant at his desk in the lecture-room at seven o'clock punctually, the lecture lasting two hours. His special lectures he was now obliged to give up, owing to the pressure of literary work. But besides those on logic and metaphysics, he had to deliver regular courses on ethics, natural theology, anthropology and physical geography, all of which were attended by literally "overflowing" audiences not alone consisting of students, but composed of men of mature years, from among all classes of the outside public. As time went on, the bulky manuscript originally employed grew smaller and smaller, till at last it dwindled to a piece of note paper, on which were jotted a few memoranda. His delivery is described as much more readily comprehensible, even on subjects in themselves obscure, than the literary style of the later works. Kant, when reproached with the clumsiness and obscurity of the latter, used to excuse himself by the reply, that they were only written for professional thinkers; that a special terminology had the advantage of brevity, and that, besides this, he liked to flatter the vanity of the reader now and again with obscurities and misunderstandings to give him the opportunity of exercising his wits upon them; it was otherwise in oral discourse, the object of which was to introduce the hearer to the subject. Kant's logic lectures were less designed to expound a completed science than to teach his hearers how to think for themselves. With him formal logic was a means rather than the end it is with many academical exponents of the subject.

In his philosophical lectures Kant had the habit of following his main idea into side issues, often at such length and in such detail as to be in danger of losing sight of it altogether. On these occasions, he would suddenly break off from his digression with the words, "In short, gentlemen," and thus regain, as quickly as possible, the main thread of the argument. His naturally weak voice prevented his being heard at the farther end of the room with distinctness, while the slightest noise rendered him completely inaudible. But the respect, almost amounting to reverence, universally surrounding him, secured a breathless silence the moment he appeared at the lecture-desk, before which he was accustomed to sit while speaking. He had a habit, on commencing, of fixing his eye on some individual immediately in front of him, in order to read, by the expression of the face, whether he was being understood. This, sometimes, had unfortunate consequences, as any marked peculiarity in person or in dress, was apt, by involuntarily engrossing his attention, to completely disturb the current of his ideas. Jachmann relates, that on one occasion he entirely lost himself, owing to a missing button on the coat of one of his audience. His eye and thoughts were alike irresistibly drawn to this defect. The same thing occurred if an imperfection in the teeth caught his attention, an unusually open shirt front, or any exceptional "cut" of coat.

As dean of the university, a post he several times occupied, Kant had the reputation of being a strict examiner, but he never demanded more of students than the state of education in the higher schools admitted of. Jachmann amused Kant in after years, by describing the anxiety of himself and his teachers lest he should fail in passing the ordeal, especially as he had been trained in the antiquated Crusian philosophy. But, as Jachmann observes, Kant was too much a philosopher himself, to

make any given system of philosophy the basis of examination. The functions involved in the rectorate of the university, which office he filled for the first time in 1786, the year of the death of Frederick II., he exercised "with dignity, without oppressive severity." His views of academic discipline were of the most liberal nature, and he was never harsh on the minor irregularities incidental to student life. He expressed a disbelief in hothouse training, and his conviction of the desirability of considerable latitude being permitted for the individual character to expand itself. In short, he was, throughout his official career, beloved by the students, whom he treated with an almost paternal tenderness and interest.

On an increased grant being made to the university, Kant, of course, received his share in common with the other professors in the shape of an improved stipend. But a special and almost unparalleled favour was shown in his case by an addition of 220 thalers from the central state funds. Kant's correspondence with Marcus Herz attests his prodigious literary fertility during this period. Dr. Herz was a favourite pupil of Kant's, and one of the first public exponents of his system, which he introduced to the Berliners before the 'Critique' itself had appeared. The correspondence between the two men was kept up for many years, and only collapsed finally, owing to the extended medical practice of Herz, absorbing time and energies previously devoted to philosophical studies. The letters to Reinhold also illustrate the nature and extent of Kant's work towards the close of this period. The old friendship or acquaintance with Hamann, for some time interrupted, was renewed in 1780, about which time Kant seems to have revised a translation of Hume's 'Dialogues concerning Natural Religion,' which Hamann had made, while Hamann undertook to negotiate for the publication of the 'Critique.' The latter writes to Herder

under date April 8th, 1781, "The day before yesterday I received the first thirty sheets of the 'Critique of Pure Reason,' but I had the strength of mind to resist looking at any of it till the following day. Yesterday I remained all day at home, and swallowed the whole thirty sheets at a gulp. . . . It seems to me to be tolerably free from printers' errors, though my eye caught sight of a dozen or so. According to all human probabilities it will create an excitement, give occasion to new investigations, revisions, &c. But in the end, very few readers will be equal to the scholastic nature of its contents. It increases in interest as you go on, and there are fresh and charming oases, after one has been wading in the sand for a long time. Altogether, the work is rich in prospects and leaven to new decoctions whether within or outside the faculty." And again, "On May 8th, on Sunday, I received eighteen sheets from Kant, but it is not yet finished, and will hardly be so in ten sheets more." Finally on August 5th, he writes, "A week ago to-day, I received a bound copy from Kant. On the 5th of July I sketched a criticism *en gros*, but have put it aside, because I do not care to offend the author, he being an old friend, and I might almost say benefactor, seeing that I owe my first post entirely to him; but should my translation of Hume see the light ever, I shall hold no leaf before my mouth, but shall say what I think. Kant has the intention of bringing out a popular abstract of his work." The popular abstract referred to was the Prolegomena. Hartknoch, the original publisher of the 'Critique,' expressed the wish to undertake the latter work, and received, through Hamann, a reply from Kant, accepting his offer, but intimating at the same time that, as far as his other writings were concerned, he could not pass over the local booksellers, of whose shops he made such extensive use. This resolution he adhered to, and, in spite of the pressing

offers of other firms, gave almost all his subsequent works into the hands of Nicolovius, a young bookseller of Königsberg. Hamann, who, during the publication of the Prolegomena, seems once more to have quarrelled with Kant, exhibited nevertheless considerable interest in its progress, making repeated inquiries of Hartknoch on the subject.

The adverse criticism of Herder's 'Ideas to a Philosophy of History of Mankind' excited considerable attention at the time it was written. There was published in the *Deutsche Mercur*, a bitter reply, curiously enough by Reinhold, subsequently Kant's most ardent disciple, which elicited a rejoinder from Kant even more severe than the original criticism. In 1785 appeared the 'Metaphysic of Ethics,' the first edition of which was sold out in a few months, and a second, almost unaltered, issued early in 1786. Towards the end of the same year, we find Kant studying Jacobi's recently published 'Letters to Moses Mendelssohn on the Doctrines of Spinoza.' Hamann says Kant could never make anything of Spinoza, though he had many long conversations on the subject with his intimate friend Kraus. In a letter of a few weeks later to Jacobi, he writes, "Kraus told me, that Kant had the intention to refute Mendelssohn, and make the first onslaught in a polemic against him. He confessed, notwithstanding, that with himself, as with Mendelssohn, your exposition was just as incomprehensible as the text of Spinoza." Hamann's letter to Jacobi of Nov. 20th contains the important statement (if it is to be relied on) that "Kant confessed to me, that he had never properly studied Spinoza, and that, being taken up with his own system, he had neither the desire nor the time to enter into others." Shortly after, we hear from the same source, that the notion of refuting Mendelssohn had been given up, but that Hamann was going to do all in his power to induce

Kant to reconsider this decision, when the death of Mendelssohn, shortly after, terminated the matter. Kant's admiration for Mendelssohn's style was very great; indeed his estimate of the Jewish writer's genius seems to have been somewhat exaggerated. It is probable that they never came personally into contact, but several letters passed between the two thinkers.

Kant's academic fame was now (1786) at its height. Places had to be taken at least an hour before the commencement of the lecture, so great was the "rush." I must not omit to mention an important change in our philosopher's mode of life, which took place a little while before this time. In 1783 he had purchased the house which he retained till death. It was situated in the centre of the town, and may still be seen, bearing, on a marble tablet, the inscription, "Immanuel Kant lived and taught here from 1783 till the 12th of February 1804." A few years later, he established a *ménage* of his own. It is almost needless to say this was of the greatest simplicity, Kant's abhorrence to the least appearance of ostentation being proverbial. From this time he regularly invited a few friends to dine with him every day, with the exception of Sunday, when he dined at the house of the English merchant, Motherby. He could not entertain more than six persons at the table, as his dinner-service only accommodated that number. Among the friends invited, one of the most constant was Professor Kraus. Kraus was also a frequent companion of Kant in his daily constitutional walks. Kant often intimated to various members of his acquaintance that he regarded Kraus as one of the greatest intellects the world had ever produced. "Of all the men I have ever known in my life," he used to say, "I have found none with such a talent for comprehending everything, and learning everything, and yet for excelling, and distinguishing himself in everything, as

our Professor Kraus. He is quite a unique man." Kraus, on his side, denied himself his single relaxation, a summer trip to the country residence of his friend Auerswald, in order to spend the vacations with his old teacher Kant. This friendship with Kraus lasted uninterruptedly till the death of Kant, although latterly, for various reasons, the two men saw each other less frequently than at the period of which we are speaking.

Another of Kant's "table-companions" was Hippel, a man of tremendous conversational powers, and of varied culture. His intimacy with Hippel was not of the same nature as that with Kraus, being chiefly limited to mutual invitations to dinner, but the acquaintance thus far continued without any noteworthy breach till Hippel's death in 1796. Two letters of Kant to Hippel are preserved, which are not uninteresting, one as exhibiting the humorous side to Kant's character, and the other his good nature. Hippel, it should be premised, at the time, held the office of Chief Burgomaster, police-director, and inspector of the city prison. The first letter, dated July 9th, 1784, runs as follows: "Your excellency was so good as to desire to remove the grievance of the inhabitants of the *Schlossgarten*, with regard to the stentorian tones of the hypocrites in gaol. I do not think they would have cause to complain that their souls' salvation was in danger, if their voices were moderated in singing, so far that they might be heard with closed windows, without having to exhaust themselves by shrieking. The testimony of the warder, with which it seems you are chiefly concerned, as to their being a God-fearing folk, you might have, notwithstanding, for *he* would still be able to hear them, and after all, their tones would only be lowered to the point which the pious burghers of our good town find adequate to their edification, in their own houses. One word to the warder, if you will send for him, and order

him to make the above a fixed rule, will suffice to put a stop to this nuisance for once and for all, and remove an annoyance from him, whose peace you have been good enough to promote on more occasions than one, and who will always remain, with the deepest respect, your most obedient servant, I. Kant."

The second letter, dated the 29th of September, 1786, commences with a compliment on a title being conferred on its destined recipient, but the real object is to petition for the continuance of the stipend of a young student: "Your excellency, accept my sincere congratulations on the well-merited distinction appended to your name, which, although it can add nothing to your already well-established public recognition, is a pledge that you will meet with less opposition in your purpose of doing good, the only interest I know which you have at heart. Permit me, in accordance with your good nature, now to bring before you a little matter connected with the University. Herr Jachmann, the elder, has informed me that the stipend he has hitherto enjoyed by your forethought, terminates this next Michaelmas. As he is now zealously devoting himself to his medical studies, and can thus afford no time for the private teaching necessary to his subsistence, he earnestly begs you to have the goodness to allow him one of the stipends announced in the 'Intelligencer.' Should you permit him, either personally or by writing, to make this application to you, please to give me a hint of the same. This act of goodness will always profit a brave, thoughtful, and talented young man: so much I can vouch for. I remain, with respect and affection, yours ever, I. Kant."

We have now reached the period when Kant had become the central figure in the intellectual world of Germany. The 'Critique of Practical Reason' appeared in 1788, and the 'Critique of Judgment' in 1790. The

critical philosophy, now complete, was being taught in every important university throughout every German-speaking country, irrespective of creed. Men of science, no less than philosophers, were attracted to it on all sides. Professors and savants made pilgrimages to Königsberg from the most distant places—Berlin, Jena, Heidelberg, Wurzburg, and even Vienna—to visit the philosophic Jupiter of the Baltic town, and seek elucidation on obscure points in the 'Critique.'

When it is remembered that at the period in question not merely were railroads undreamt of, but even good roads all but unknown in central Europe, the enthusiasm and determination which led to journeys being undertaken involving the expense and fatigue these must have done, will be fully realised. Sometimes, it is true, the cost was defrayed by the prince or grand-duke of the State in which some prominent university was situated, but such cases were exceptional.

It would hardly be rash to say that no single book has ever achieved a success at once so rapid and lasting as the 'Critique of Pure Reason.' Although just at first it failed to attract much notice, within ten years of its publication it occupied the position of a classic. For such an effect to be produced by a philosophic work, written without any regard to style whatever, is a unique fact in the history of culture. A new light had, as Schiller expressed it, been lighted for men.

"Many regarded Kant as the prophet of a new religion, and Reinhold declared that, 'in a hundred years Kant would have the reputation of Jesus Christ.' The Jena *Allgemeine Literatur Zeitung* proclaimed a *novus ordo rerum*. In the course of some ten years 300 attacks and defences of Kant's philosophy appeared. The enthusiasm aroused the hatred of opponents. Herder characterised the whole movement as a St. Vitus's dance, while fanatical priests

sought to degrade the name of the sage of Königsberg to a dog's name. We must not alone be acquainted with the books written from a more or less impartial standpoint, but also with the subjectively coloured pamphlets and letters belonging to the period, to form an adequate idea of the, at present, almost inconceivable commotion. The powerful impression of the Kantian philosophy on all classes in the nation, implied a corresponding influence on every sphere of intellectual activity. Theology, jurisprudence, philology, even natural science and medicine were soon drawn into the movement, quite apart, of course, from the special philosophical disciplines which were subjected to its mighty influence.* "

The critical movement, at first confined to Germany, was not long in spreading over Europe. Nitsch, a pupil of Kant, appeared in London in February, 1794, with a prospectus bearing the psychologically coloured heading, 'Proposals for a course of lectures on the perceptive and reasoning faculties of the mind, according to the principles of Professor Kant.' In this prospectus he offered to deliver three lectures, admission gratis, and at the close of each to defend the principles enunciated against all comers. On the evening of the 3rd of March, the occasion of the first lecture, the street in which the lecture-room was situated was early lined with carriages, and Nitsch, on his appearance on the platform, found himself confronted by a large audience, composed of members of the nobility, the clergy, and the "learned" professions generally, and including, as we are informed, many "richly attired" ladies. The lecture lasted an hour and a half, and was received with applause, but Nitsch had no sooner concluded than he was forced to commence a disputation, lasting two hours, in the course of which he was required to answer every conceivable objection that could

* Vaihinger, Commentar, pp. 9, 10.

be raised in a running fire of questions. So successfully did he pass through this ordeal, and so much interest did the three introductory lectures evoke, that a sufficiently large number of subscribers was got together to make it worth while for him to undertake a course of thirty-six lectures, at a fee of three guineas each person, expounding in detail the principles of the critical philosophy. He concluded them in August. But, meanwhile, the desire for further information had become so great, that a repetition of the lectures was commenced the following October, and a subscription raised for their subsequent publication.

The success of Nitsch in his introduction of "criticism" into England is certainly somewhat surprising, when we consider the newness of the doctrine, and the conservative nature of English thought. It is difficult to conceive that his hearers, accustomed as they were to a treatment of philosophical questions so alien to that of Kant, really comprehended the full bearings of the new system.

The next representative of Kant's principles in this country, was John Richardson, who studied philosophy in Halle under Beck, and on his return to England published a translation of the 'Prolegomena,' and some other short pieces. Richardson admits, in his preface, that he had found the transition from empiricism to critical idealism very difficult, notwithstanding his having had the advantage of a German university education.

In France, where the Revolution was at its height (the Revolution which was the deathblow of the material structure of ages, as Kant's philosophy was of the intellectual structure of ages), and communication with central Europe was interrupted for some time, except the *pièce d'occasion* entitled, 'Everlasting Peace,' translated in 1795, little was known of Kant beyond the fact

that he was the head of a great intellectual movement in Germany, till, in 1798, the recently established *Institut Nationale* ordered a report of the new doctrine to be laid before it. In the following year (1799), Kant's first French disciple, Charles François Dominiquo de Villers, published at Metz an abstract of tho 'Critique,' and, a year or two later, another treatise, entitled *La philosophie de Kant, ou principes fondamentaux de la philosophie transcendentale.*

Among the other Latin nationalities, Kant remained little more than a name till somo years after his death, and the same may be said of tho Slav countries of Eastern Europe. In the Netherlands, on the contrary, in 1796, an elaborate work in four volumes, 'De Beginzels der Kantiaansche Wysgeerte,' was published, in which, notwithstanding its modest title, critical principles were exhaustively expounded, while in October 1798 a new magazine, the 'Kritische Magazin,' was founded for the express purpose of propagating and defending the principles of the new philosophy.

Among the numerous pilgrims to Königsberg, one of tho most interesting, if not from any special eminence, from the probably unique enthusiasm Kant inspired in him, was the Berlin physician Erhard, who arrived in Königsberg about the same time as Fichte. "All pleasure that I have ever had in my life," he writes in his autobiography, "is as nothing against the thrill sent throughout my whole soul by several passages in the 'Critique of Practical Reason.' Tears of the highest rapture, how often have I not shed over this book? The very recollection, even now, of those happy days brings tears to my eyes." And again, "Do I hold my own in the battle with the crushing thought with which the history of the time, like an evil demon, so often fills my soul—that the belief in the development of humanity in the whirl of human action, is an old wives' fable, designed to restrain

the child from wandering down the path of coarse pleasures, and an empty consolation for the jubilation of his comrades—do I withstand this soul-oppressing thought, then it is thy work, my teacher, my spiritual father."

The last letter (April 16, 1800) of Erhard to Kant closes with the words, "Think of me as of a son who intensely loves and reverences him who brought him up, for you are even to me as my father, though him I have to thank that he left me prepared for your instruction."

Among the eminent men, not professional philosophers, who, at this time (1790–1800), were zealous votaries of Kant, foremost stand Schiller, Wilhelm von Humboldt, and Jean Paul Friedrich Richter. The influence of Kant on Goethe was less marked, and probably in the main derived from Schiller. The 'Critique of Pure Reason,' he said, lay outside his sphere, though the 'Critique of the Faculty of Judgment' seemed to have interested him considerably. He admits that much in Kant's thought he was unable to assimilate. How thoroughly, on the other hand, Schiller was imbued with Kantianism his works and letters testify. Wilhelm von Humboldt remarks in the 'Introduction to his Correspondence with Schiller' (published in 1830): "Kant undertook and completed the greatest work for which the philosophic reason has to thank any single man. He proved and sifted the whole of philosophic procedure, in a way that led him to encounter the philosophies of all times and all nations. . . He carried, in the true sense of the words, philosophy back into the human bosom. Every attribute of the great thinker he possessed in the fullest measure." The whole of this introduction is masterly in its estimate of Kant's work, but belonging as it does to a period long subsequent to the death of Kant, our only purpose in alluding to it here is, to show the impression left on the mind of Humboldt by the study of the 'Critiques' undertaken by

him between thirty and forty years previously, and which is abundantly reflected in the correspondence itself.

The enthusiasm of Jean Paul is characteristically expressed in a letter to his friend, the Pastor Vogel: "For Heaven's sake buy two books, Kant's 'Foundation to a Metaphysic of Ethics,' and Kant's 'Critique of the Practical Reason.' Kant is no mere light of the world, but a whole dazzling solar system at once."

The bulk of Kant's collected correspondence falls within these last twenty years of the century, the crowning period of his life. It comprises, amongst others, letters to and from Moses Mendelssohn, Marcus Herz, Reinhold, Schiller, and Fichte. As instances of Kant's epistolary style, we quote letters to the two last-named, respectively.

Schiller had written, asking Kant to contribute to his newly-founded periodical, *Die Horen*, at the same time taking the opportunity of thanking him for a favourable review of his (Schiller's) essay on 'Grace and Dignity,' and acknowledging his indebtedness to the critical philosophy. Kant replied nine months subsequently (Schiller's letter is dated June 13th, 1794, and Kant's, March 30th, 1795), as follows: "The acquaintance and literary intercourse of a learned and talented man like yourself cannot, my dear friend, be otherwise than desired by me to enter upon and cultivate. The plan for a new journal, communicated by you last summer, came duly to hand, also the two first numbers a short time ago. The letters on the 'Æsthetic Education of Man,' I find admirable, and shall study them in order to be able to communicate to you my ideas on the subject. The paper contained in the second number on the difference of sex in organic nature, I cannot decipher, although the writer seems a capable man. . . An idea of the kind flashes across one's mind occasionally, but one does not know how to make anything of it. For instance, the natural

arrangement that all impregnation in both of the organic kingdoms requires two sexes, in order to propagate its kind, is always astonishing, and opens up an abyss of thought for the human reason. If we are unwilling to assume providence to have chosen this arrangement, in a playful manner, as it were, to avoid monotony, but believe ourselves to have reason for regarding it as the only possible one, an infinite prospect lies before us, of which we can make simply nothing,* as little indeed as from what Milton's angel tells Adam of the Creation: 'Male light of distant suns mingles with female for ends unknown.'† I am concerned lest your journal should be prejudiced by the fact that your writers do not sign their articles, and thus make themselves responsible for their opinions, a point which interests the public very much.

"For this gift, then, I offer my best thanks, but as regards my small contribution, I must ask for a somewhat long postponement, since political and religious matters are now under a certain embargo [referring to the stringent press censorship, of which more later on], and beside these subjects, there are hardly any of interest for articles such as would commend themselves to the great reading world, at least at this moment; so we must watch for a change in the weather, and accommodate ourselves to the time. I beg you to give Herr Professor Fichte greetings and thanks for the many works from his pen which he has sent me. I would have done this myself if the variety of my labours, and the discomforts of old age had not compelled me to postpone it constantly. Kindly give my remembrances also to Herren Schultz and Hufeland.

"And now, dearest man, I wish your talents and good intentions adequate strength, health, and longevity, the

* Compare note to p. 97 (Prolegomena).

† This apparently refers to a passage in the eighth book of 'Paradise Lost.'

friendship included, with which you honour him who is, with the greatest esteem your devoted and true servant, Immanuel Kant."

The letter to Fichte which we quote, is, as far as we are aware, the last written by Kant to this philosopher. Rather more than a year subsequently, Kant, possibly from fear of sharing the charge of atheism that had been brought against Fichte, made a formal declaration that he considered the *Wissenschaftslehre* "to contain an utterly untenable system." The curt, and certainly unjustifiable language of this manifesto naturally created an irreparable breach between the two thinkers. The letter itself, although, on the whole, friendly, is not without one or two sneers at the Fichtean system, betokening the coming rupture, as will be seen: "Highly valued friend," writes Kant, "should you take my three-quarters of a year's delay in answering you for a want of friendship or impoliteness, I could never forgive you. Did you know my state of health and the weakness of my age, which have compelled me for the past year and a half [the letter is not dated, but was probably written towards the end of the year 1797], certainly not out of laziness, to give up my lectures, you would find my behaviour excusable, notwithstanding my now and then giving notice of my continued existence by means of the *Berliner Monatschrift* and more recently of the *Berliner Blätter*, a thing I accomplish slowly and with exertion, and even then feel myself driven into practical departments, the subtilties of theoretical speculation, especially when it refers to your finely pointed *apices* being willingly left to others. That I have chosen no other journal than the *Berliner Blätter* for my recent productions, you and my other philosophic friends will lay to the score of invalidism. The reason is, that in this way I see my work published and criticised soonest, for, like a political paper, it satisfies expectation almost

daily, and I do not know how long it will continue possible for me to work at all. Your books, sent in 1795 and 1796, have come to hand by Herr Hartung. It is a particular pleasure to me that my ideas on jurisprudence meet with your approval. Pray do not hesitate to further honour me with your letters, if your objection to my delay in answering be not too great, as well as to forward me literary reports. I shall man myself, in future, to be more industrious in this matter, especially as I see by your recent pieces that your excellent talent is developing a vigorous and popular style in exposition, that you have already passed through the thorny paths of Scholasticism, and will not find it necessary to return to them. With perfect esteem and friendship, I am always, &c., I. Kant."

To this Fichte replies, that he does not for a moment contemplate bidding farewell to Scholasticism, but that on the contrary he carries it on with pleasure and facility as it strengthens and raises his powers.

Kant's objection to Fichte's system as being purely *formal* and logical, and inadequate to explain the *real*, inasmuch as it makes abstraction of the *material* element essential to reality, although by no means unfounded, especially as regards its later developments, will apply perhaps more to the systems of Fichte's successors, Schelling and Hegel.

Before concluding the subject of Kant's correspondence, we append a specimen of a singular class of letters, of which he was a not infrequent recipient. The writer was an Austrian baroness, Maria von Herbert by name; she and her brother were victims of the sultry moral atmosphere characterising the decades of the last century immediately preceding the French Revolution: "Great Kant!" runs this erratic epistle, "to thee I cry as a believer to his God for help, be it for consolation or for sentence of death. The grounds assigned in thy works for continued existence

are suffieient for me. Hence my flight to thee. For *this* life I found nothing—absolutely nothing—to replaee my lost treasure, for I loved one who in my eyes was *everything*, so that for him only I lived. He was to me a eompensation for all that I laeked, for all else seemed a toy, and all other human beings vapid and empty. I have offended this objeet of my affection by a lie of long standing, which I have only just eonfessed to him. And yet it eontained naught affeeting my eharaeter, for I have never had a viee to eoneeal. But tho lie alone was enough for him, and his love vanished. He is an honourable man, and therefore he does not deny me friendship and fidelity, but that inmost feeling, which attracted us involuntarily to eaeh other, is no more. Oh, my heart will break into a thousand pieces. Had I not read mueh of your * writings I had eertainly, even now, ended my life by violenee. [The writer eommitted suieide six months after Kant's death.] But the eonelusion I am foreed to draw from your theory, that I ought not to die beeause of my wretched life, but to live even in my present existenee, held me baek. Now put yourself in my plaee, and give me consolation or eondemnation. I have read the 'Metaphysies of Ethies,' with its eategorieal imperative. It does not help me. My reason forsakes me when I need it most. An answer, I eonjure you, or you do not act aeeording to your own Imperative." †

Unfortunately Kant's reply to this strange eommunication is lost. Borowski states that Kant persistently postponed produeing it when asked for by him. But even apart from the eomments of a great man, the letter has its "human" interest, as has every fugitive glimpse, of one of

* The ehange to the ordinary pronoun of polite address is in the original.

† The original completely ignores the canons of orthography and punetuation. Two subsequent letters of Maria von Herbert to Kant are extant. The letter is unsigned, but the name and address are given at the top.

those tragedies of which the world knows nothing, and the very actors in which pass for ever from mortal ken in a few years, one of those instances of individual suffering that the tide of time sweeps in such countless numbers into the ocean of oblivion. History, the mind's eye of the race, sees the individual only through the universal, only as the concrete mark of some universal schema; the individual as such exists only for a few other individuals and perishes, even as a name and a memory with them; thus affording us in a possibly unexpected manner an illustration of the critical doctrine that the universal alone gives reality and persistence to the particular. We know Maria von Herbert only as a background to Kant, the figurehead of a great intellectual movement.

In the midst of all this fame and homage—a fame and homage such as it has been the lot of few men to attain during their lives—trouble was preparing for Kant. His staunch friend and "protector," the minister Von Zedlitz, resigned his office in the educational department of the ministry, on July 3rd, 1788, and was replaced by a *ci-devant* cleric, Johann Christoph Wöllner, whose first act was the issue of a rescript to the ministers of the Lutheran and Calvinistic churches, warning them against the rationalistic "errors" prevalent. This was followed a few months later by an edict limiting the freedom of the press. The evils of unrestrained liberty in the expression of opinion were dwelt upon with the emphasis usual to such productions, and all writings ordered to be submitted to special bodies, whose authorisation was to be necessary, prior to publication. A committee of obscurantist clergy was thereupon appointed in Berlin for adjudication on works affecting religion. Their attention was soon turned to the founder of the critical philosophy, but the victim was so well intrenched in the favour of public opinion, that more than ordinary circum-

speetion had to be employed in the attack. One of their number accordingly drew up a report to the King, in which the desirability of prohibiting the publication of any further works from Kant's pen was delicately suggested. This flank movement seems, for the time at least, to have come to nothing. But the course of events assisted the obscurantists. With the progress of the French revolution the portentous charge of Jacobinism came every day more conveniently to hand as a weapon for branding all aspirations after freedom, whether social, politieal, or religious, till, with the general armament of 1792, the full tide of the reaction destined, in its political aspect, to eulminate in the infamous Holy Alliance, set in. All who refused to anathematise every person and thing having any connection near or remote with the great eonvulsion became an objeet of suspieion, and of governmental if not social ostracism.

On September 14, 1794, an ordinance was promulgated, that all teachers, in the universities and higher seminaries, no less than the lower sehools, should pledge themselves to adhere in their instruction to the letter of the orthodox creed. It happened that at this time Kant's more important works, touching directly on religious and political subjects, were being published. The authorities at Berlin, with characteristic stupidity, instead of seeing in these the natural development of principles eontained in the system from the beginning, thought they detected a deliberately planned attempt, on the part of a thinker of pre-eminent influence, to undermine the *status quo*.

Kant's treatise on 'Radical Evil' was allowed to pass, on the score that only deep-thinking scholars read Kant's works. But the publication of a second essay 'On the Conflict of the Good Prineiple with the Evil for the mastery in Man' was prohibited as "striking at the root of Biblical theology." A remonstranee on the part of the editor

of the *Berliner Monatschrift*, in which the essay was to appear, was repulsed with a curt refusal to enter further into explanations. The difficulty was obviated as concerns the ensuing treatise on 'Religion within the Boundaries of mere Reason,' by its publication at once as an independent work by Nicolovius of Königsberg—the Königsberg theological faculty, consisting for the most part of zealous friends of Kant, as may be supposed offering no objection. In the preface to this work Kant takes the opportunity of defining his views on the relations of the two faculties of philosophy and theology, and of protesting against the intrusion of a theological censorship in works written from a philosophic standpoint, and for philosophers. But the reactionaries at Berlin were inexorable. Nettled by the fact that the work last-mentioned reached a second edition by Easter, 1794, they at once set about the consideration of means for more effectually silencing the voice of the intellectual Titan. Their deliberations resulted in the issue of an Order in Council, dated the 1st of October, 1794, which, after charging Kant with undermining and defaming the fundamental doctrines of Christianity, forbade him, under pain of royal displeasure, from further expounding his views either by lecturing or writing. This order was communicated directly to Kant in person. He refrained from mentioning the circumstance even to his intimate friends, but replied, pledging himself to abstain from publicly expressing his views on any question affecting religion or theology. Among his papers a note relating to this incident was found after his death in which he says: "Recantation and abnegation of one's inmost convictions is contemptible, but silence in a case like the present is the duty of a subject. Although all that one says must be true, one is not bound to express every truth publicly." The action with regard to Kant was followed by the

expulsion of all theological candidates, who refused to belie their convictions, from the faculty, and the prohibition of all professors discoursing on the doctrines contained in Kant's "Religion within the Boundaries of mere Reason." The loss of the theological lectures was severely felt by Kant, as his bodily powers were now rapidly waning, and he was extremely anxious to establish a school of liberal theologians to carry out the work he had commenced. There can be little doubt that this, combined with the painful impression produced by what Kant felt as an insult offered him in his old age by a shameless ignorance and bigotry under the ægis of the very department which, in the person of its late chief, had been the first to honour him, contributed to accelerate the progress of the symptoms of senility already appearing.

From this time he went little into society, and the following year (1795) gave up all his lectures with the exception of those on logic and metaphysics, which were reduced to one hour daily. He worked, notwithstanding, zealously at the completion of his 'Anthropology' (destined to be his last publication), and at other literary projects, the principal being the second part of the 'Metaphysics of Ethics' and the 'Theory of Jurisprudence,' which he was now annotating and revising. In 1797 the two latter works were published, and almost immediately after, for the first time, unmistakable and serious signs of decay manifested themselves in the form of an alarming illness, from which he but slowly recovered. The last term of Kant's lecturing was ushered in by a procession of all the students of the university, in holiday attire, before his house. Kant was much pleased by the present from Hufeland of his recently published 'Art of prolonging Human Life.' The book was a favourite companion ever after, and he frequently made extracts from it. The letter of Hufeland's which accompanied his gift affords one other instance

of the deep reverence in which the mighty thinker was held by contemporary men of science. Another writer (at the time of some eminence) with whom Kant had epistolary intercourse at this time was Garve, whose last work, a translation of Aristotle's 'Ethics,' was dedicated to him.

With Michaelmas, 1797, Kant's academical career and public life terminated. On the 16th of the following November the reactionary and orthodox King Friedrich Wilhelm II. died, and with his death the game of the obscurantists was played out. His ministry retiring immediately after, the oppressive press regulations were rescinded. These circumstances led to the issue by Kant of an essay on the 'Conflict of the Faculties,' in which the subject of freedom of the press generally was treated.

The 'Anthropology' appeared in 1798, with a remark appended to the preface, that the author had intended issuing a similar manual of Physical Geography, but would probably be prevented by the infirmities of old age, and intimating the fear that the notes prepared for this purpose would be too illegible to admit of the labour being undertaken by any one else. Several pupils at once expressed their willingness to do their best; but Kant, averse to delegate the work to others, waited in the hope that a little rest would enable him personally to complete the task to his satisfaction. Only on finding the utter hopelessness of this, did he entrust Professor Rink with the work of preparing and editing his lectures and scattered notes on 'Physical Geography,' together with those on 'Pedagogie,' at the same time giving his pupil Jäsche permission to publish in completed form the notes he had taken of Kant's lectures on Logic. It may be mentioned that the 'Anthropology,' the last work from Kant's own pen, in spite of its appear-

ing in an edition of 2000 copies (a larger issue than that of any previous work of Kant's), was exhausted in a few months, and another almost as large demanded. Meanwhile, twilight, forerunner of the eternal darkness soon to come, was gathering apace around the mighty intellect. Yet, even now, in his growing weakness, schemes of a great philosophical undertaking floated before the mind of Kant. It was to be entitled 'The System of Pure Philosophy in its whole Content,' and was to exhibit, among other things, the transition from Physics to Metaphysics. It is probably identical in conception with the work indicated years before, in the first edition of the 'Critique of Pure Reason,' as being in contemplation. He worked on it every day as long as his strength permitted till the year before his death. He said it was to be his *opus maximum*. It is described as intrinsically worthless, mostly consisting of repetitions of previous ideas, interspersed with passages of which it is impossible to make any sense.

In the year 1802 his memory failed him with remarkable suddenness. He was unable to recall the most familiar names of persons and places. Before long he could not converse connectedly, owing to the same cause. But though the commonest words and idioms forsook him in speaking, it was with a reluctance amounting frequently to irritability that he permitted assistance from any one.

Kant never deceived himself as to his weakness and approaching death. Already, in 1799, he used to say to his "table-companions," "I am old and weak, you must regard me as a child." In 1802, although he had no special attacks, his weak state compelled him to adopt a new *régime*. He gave up his old plan of rising at five in the morning and retiring at ten at night. At first he derived benefit from the prolonged rest, but this was but

temporary. He soon found a difficulty in walking or standing, and had many falls, though none of a serious nature. On such occasions he used to joke, saying that the lightness of his body prevented disastrous results. His regular walks had now been given up for some time, and the only outdoor exercise he took was an occasional quiet promenade in the Königsgarten near his house. In spite of the measured and careful way in which he was accustomed to plant his foot on the ground, he had one fall in the street, when two young ladies who were passing assisted him home and received as a *souvenir* the rose he was carrying in his hand. From this time forth he never again ventured outside the house alone. Even reading, his chief occupation, was becoming irksome to him, and for the first time in his life he acquired the habit of falling asleep in his chair. His woollen cap, coming in contact with the light on the table at his elbow, caught fire on one of these occasions.

Domestic arrangements were now given over mainly to the superintendence of friends, Kant's former pupil, Wasianski, his most intimate companion during the last three or four years of his life, being entrusted with pecuniary matters, and made his executor.

In January 1802, Kant had felt himself obliged to make a change in the *personnel* of his household. He had to dismiss his old attendant Lampe. This worthy, owing to his connection with Kant, has obtained sufficient notoriety to warrant his detaining our attention for a moment. Formerly a soldier in the Prussian army, though a Bavarian by birth, Lampe had entered Kant's service immediately on leaving his regiment. His behaviour at the first was such as to lead Kant to entertain a high opinion of him, and show him considerable liberality in various ways. This conduct, however, soon changed. He was continually making demands on Kant's purse

by careless or unscrupulous expenditure, getting drunk, quarrelling with the cook, stopping out late at night and otherwise rendering himself obnoxious. This altered demeanour in the course of time decided Kant to get rid of the man. But the matter seems to have been pending some years. At his advanced age Kant was naturally averse to changes of a domestic nature, particularly as he conceived he might find a difficulty in getting well suited. The result was that the matter went on till January 1802, when Kant one morning confronted Wasianski with the announcement that Lampe had behaved to him in a way he was ashamed to repeat, and that he must dismiss him without further delay. Wasianski, with little difficulty, procured another attendant, Johannes Kaufmann by name, who proved admirably adapted to the requirements of the situation, and Lampe received his *congé*, and, in consideration of his thirty years' service, an annual pension of forty thalers for the remainder of his life, to cease at once, should he at any time enter the house, or otherwise annoy Kant. Nearly a month afterwards, a *Dienstschein* (the German form for servants' characters) was forwarded to Kant from Lampe to be filled up. After some hesitation Kant wrote:—"He (Lampe) has proved himself faithful, but for me no longer suited." A "peace, retrenchment and reform" now reigned in the domestic affairs of the house on the Schlossgarten, which contrasted favourably with the continual quarrels with the cook, defective management and general unsatisfactoriness of the latter part of the Lampe period. Kant's excessive delicacy in social matters is evinced by his embarrassment at having to call his new servant Kaufmann (merchant) when Motherby and other of his "table-companions" were, or had been, engaged in commercial pursuits. So strong was his feeling on this point that he

subsequently adopted the practice of calling him by his Christian name, Johannes.

In the spring of the year Kant awaited with impatience the arrival of a linnet which was accustomed to sing on the windowsill of his study. He was a great lover of birds, and used regularly to feed the sparrows that built their nests under the eaves of the house. As the season advanced, Wasianski persuaded him to take some drives, to which he consented with some reluctance. The usual concomitant of greatness attended him on these occasions. Crowds assembled to see him come out, as soon as the carriage drove up to the door; and as long as he remained within the precincts of the town it was difficult to evade the eager curiosity of sight-seers. As the winter drew near, he complained much of flatulence—a malady nothing seemed effectually to relieve. His indisposition to food also increased. The winter proved a trying one for him. He expressed himself as tired of life. He could be of no use in the world any longer, he said, and was at a loss to know what to do with himself. Strange as it may seem, the desire for travel seized him now for the first time, and the notion of gratifying it the following summer was his only consolation. Towards the end of the winter he began to be distressed by bad dreams, as well as by the painfully continuous iteration in his mind of snatches of popular melodies, and the school-boy rhymes of his childhood.* He started up continually in the night, rang the bell violently for his attendant, who, in spite of his haste, frequently found his master already out of the bedroom and wandering about the house.

* I give the instance of the latter adduced by Wasianski in German as it is untranslatable :—

Vacca, eine Zange,
Forceps, eine Kuh,
Rusticus, ein Knebelbart,
Ein Nebulo, bist du.

Not until June did Wasianski venture to take Kant into the country. No sooner had Kant entered the carriage than he expressed the wish that the journey might be a long one, but they had scarcely reached the city gate before he was wearied and asked to return. The drive was persevered in, notwithstanding, and Kant felt the benefit in the form of increased sleep and a generally quieter night. About eight drives of a similar kind were taken during this summer of 1803. He would now frequently sit abstractedly during and after meals (the times he was formerly wont to devote to social intercourse) without saying a word. He only roused if the conversation turned on some philosophical or scientific question; on any other subject he seemed unable to collect his thoughts. Wasianski used commonly to divert his attention from his ailments by propounding some problem in physics or chemistry.

Callers were frequent, indeed, far too frequent, only a small proportion of them obtaining admission to Kant's presence. When greeted with the complimentary announcement of pleasure at seeing him, Kant would reply: "In me you see a failing, worn-out and weak old man." His aversion to seeing strangers was caused by a feeling of shame at the wreck of his former self, he presented to those who came to see "the great philosopher." Wasianski tells an amusing story of a young Russian physician who succeeded in obtaining an audience. Immediately Kant entered the room he seized both his hands and covered them with kisses. Kant, who was always averse to demonstrations of this sort, was even now in his old age embarrassed by his visitor's vigorous manifestation of enthusiasm. The next day the young man again called and begged a memento. Kaufmann, the attendant, happened to light upon a corrected proof-sheet of the 'Anthropology,' lying on the ground, which he was authorised by Wasianski to give. The enthusiast, on

receiving the *souvenir* and kissing it reverentially, took off his coat and waistcoat and handed them together with a thaler to the servant.

With the 8th of October, 1803, a serious change for the worse took place in Kant's condition. The crisis was brought on by a severe attack of indigestion, consequent on too much indulgence in English cheese, a diet of which Kant became inordinately fond during the last years of his life, to the exclusion of all taste for other food. From this time forward it was plain that the end was approaching. Though Wasianski with great difficulty persuaded him to give up the cheese, he became more and more averse to food of all kinds, while his mental and physical powers were palpably ebbing away fast. It is interesting to know that one of Kant's sisters attended him during this last illness and remained till his death.

We must pass over the next few months of suffering, and hasten to the closing scene, which we give in the words of Wasianski: "Saturday, the 11th (of February, 1804), he lay with closed eyes, but apparently free from pain. I asked him whether he knew me? He could not answer, but raised his face to me for a kiss. I was deeply moved at this, and again he motioned me with his pale lips. I almost dared to think he meant it as a parting recognition of many years' friendship and assistance. I am not aware that he ever offered one of his friends a kiss, at least I have never seen him kiss any of them, and I never before received a kiss from him myself, until a few months before his death, when he kissed me and his sister. But he seemed then as not knowing what he did in his weakness. Taking all the circumstances into consideration, I am tempted to consider this last offer as a real symbol of the friendship so soon to be ended in death. This kiss was also the last sign that he knew me. The medicine handed to him was swallowed now with difficulty, and with a

noise, such as is frequent with the dying. All the symptoms of approaching death were present. It was a solemn scene—the death-bed of the great man. . . . I remained the last night by his bed. He did not sleep, his state was more one of stupor. The spoon that was reached to him he often thrust away; but in the night, about one o'clock, he motioned for it. I concluded he was thirsty, and passed him a sweetened mixture of wine and water. He moved his mouth to the glass, and as it could not retain the liquid through weakness, he held it with his hand till, with considerable difficulty, it was swallowed. He seemed to want more; I repeated my offer until he was sufficiently invigorated to say (although not clearly), 'it is enough.' These were his last words. Several times he thrust aside the eider-down bed-covering. The whole body and the extremities were already cold; the pulse intermitted. At a quarter to four on the morning of the 12th he laid himself flat on his back, and gave his body a regular position (as it were in preparation of his approaching death), which he maintained till the end. The pulse was perceptible neither in the hands, the feet, or the throat. I tested every part where a pulse beats, and found that only in the left hip was there one remaining, which was beating heavily, but not continuously. At ten o'clock in the morning a great change was noticeable; the eye was closed and rigid, the whiteness of death was on the lips and face, and yet not the least trace of a death-sweat was visible. Towards eleven o'clock the last moment of life seemed to be near. His sister stood at the foot of the bed, his sister's son at the head. In order to view him well, and to observe the pulse in the hip, I kneeled by his bedside, for the bent position of his head (owing to old age), prevented my seeing his face in a standing position. I called his servant to be witness of the death of his good master. The moment had come in which the functions of

life ceased. Just now his esteemed friend Herr R. R. V., whom I had had sent for, entered the room. The breath was weaker, its regularity failed, it stopped, the upper lip twitched almost impereeptibly, and a weak breath followed —the last one. The pulse beat for a few seconds, it beeame slower and weaker, till it eould be felt no more. The meehanism stopped, and the last movement of the maehine ended. His death was a eessation of life, and not a violent aet of nature. The eloek now struek eleven. All attempts made to diseover whether a trace of life remained, were unsuceessful; everything indieated death. The feeling, which seized his friend and me, was unnameable and indeseribable." Thus passed away one of the mightiest intelleets the world has ever produeed.

The body of Kant was exposed to publie view in the dining-room of the house. Crowds, comprising all elasses of soeiety, thronged to gaze on the dead faee of the giant thinker. "All," adds Wasianski, "hurried to avail themselves of the last opportunity of being able to say, 'I have seen Kant.'" This lasted for some days.

Kant had, in former years, expressed his wishes as regards burial, in writing. He desired to be buried in all quietness, early in the morning, aeeompanied only by his "table-companions." He would not appear, however, in his later years, to have attaehed any importanee to this doeument, but to have left everything to his exeeutor Wasianski's diseretion. In aeeordanee with a general desire, it was deeided that the funeral should be in every sense a publie one. It took place on the 28th of February at two o'elock in the afternoon, when the "notabilities," not only of the town, but of the adjaeent distriets, assembled to do honour to the memory of their great eountryman. The students, in suitable eostume, met the proeession at the university. As the eoffin was borne out of the house, the bells throughout the whole eity began to

toll. The procession, of enormous length, accompanied by a considerable portion of the city's population, proceeded on foot to the cathedral. A funeral cantata was there sung, after which followed two orations; at the close of the ceremony Kant's body being interred in the Academical vault, beside those of his predecessors in the government of the university.

The will was proved at 21,539 Prussian thalers, or about £3,230, not much, according to current notions; but a considerable sum for a German professor to leave at that time. Kant would doubtless have left more but for the liberal assistance he rendered his relations, and the amount he gave away in charity, several poor families almost entirely depending on him for support during the winter months. Every one connected with him was remembered, down to the old cook, who received over 666 thalers, and the attendant Johannes Kaufmann, who, although he had scarcely been in Kant's service two years, obtained a legacy of 250 thalers, in consideration of his attentions during the last illness. An annuity of 100 thalers was left to his childless sister, Frau Theuerin, and one of 40 thalers to old Lampe. With the exception of one or two legacies to university colleagues, in which his library of 500 volumes was included, the remainder of Kant's fortune and effects accrued in an equal division to his nephews and nieces. It is said that Kant several times altered his will, no less than four different drafts having been found among his papers. Kant's life, as will have been seen, was a life of academical routine and study, with scarcely any incident—in which one day was like another for years in succession—and hence which, inasmuch as the variety came from within rather than from outward circumstance, fails to furnish interesting material, in the ordinary sense of the words, for the biographer.

Kant's person is described as formed by nature with the

impress of weakness upon it. Scarcely five feet high, with a sunken-in chest, and generally delicate frame, he had every appearance, when a young man, of being destined for a premature grave. In the opinion of many, it was only his punctilious attention to the laws of health and the regularity of his habits that preserved his life. His flaxen hair and mild blue eyes, combined with the fresh colour on his cheeks, which never forsook him to old age, to render an otherwise plain face agreeable to look upon, even in repose, while the fire and expression which lighted it up in speaking, transformed it at once into an object of absorbing interest. A remarkable feature in Kant's character is his modesty and dislike of everything approaching adulation, in which respect he offers a pleasing contrast to the obtrusive vanity and self-assertion of a Comte or a Schopenhauer. This modesty is observable in all his relations with other men, whether in personal intercourse or literature. At the same time he never failed to express his opinions with decision, however "high," in a worldly sense, were the personages in whose society he was. In the mansions of noblemen he was as outspoken as among his intimate friends. A love of animals and children was also a noteworthy characteristic of the founder of Criticism. His fondness for social intercourse has been more than once alluded to in the course of our narrative. It is said that at his table-talks he lavishly expended a wealth of ideas, which he seldom remembered afterwards, and was always too censorious to think worthy of reproduction or development. Moderation was Kant's great practical principle in life. His excessive regularity admitted of scarcely any interruptions. He rose punctually at five o'clock, drank two cups of tea or coffee, and smoked a pipe. He then worked till the hour for lecture, generally seven or eight o'clock. After the lecture he retired again to his study till nearly one, when

he dressed himself for dinner, which usually occupied two or three hours. On Sundays and holidays the whole forenoon, from five till one, was spent at his desk. The dinner-hour was as welcome to Kant as to many inferior mortals, though not so much for the sake of the meal as the rest and social intercourse it brought with it. After dining he took his constitutional walk, and on returning home, read journals and other lighter matter. The lecture for the following morning was then prepared, after which, at ten o'clock, he retired to rest.

Kant's relations to the female sex were few and not intimate. Twice in his life the question of matrimony presented itself to him in a practical light. The first time we are told it was a "young, beautiful and gentle" widow who won his affections. His scrupulous integrity and forethought led him, before proposing, to institute a rigorous investigation into his means for maintaining a wife and family in tolerable circumstances. Before he had concluded this to his satisfaction, the widow married another man. The second captivation occurred some years later. This time a young Westphalian girl, residing in Königsberg in the capacity of companion to the wife of a nobleman, took his fancy. A delay in the expression of his feelings again occurring from the same cause as before, Kant had the mortification of finding his beloved returned to her home, without having received his offer. We have reason to think that he never again contemplated marriage as a personal contingency. In any case, it is certain Kant remained to the end with philosophy only for a bride, and "theory of knowledge" for a child.

A somewhat bitter feeling was entertained at one time by certain members of the family at Kant's behaviour to them. It seems strange that, although resident in the same town, Kant never spoke to his sisters once in twenty-five years, especially as there does not appear to

have been any specific cause of breach between them. Without attempting to justify what probably does not admit any justification, the fact may be explained perhaps by an unwillingness to encounter the embarrassment which many of us feel in the society of those we have been intimately connected with in early years, after having lived through an intellectual experience which constitutes, so to speak, a great gulf between them and us. It is unquestionably painful to sensitive natures, to be continually reminded of the existence of this gulf, of the *rapports* which one could wish did exist, but which do not exist, and, in all probability, never will exist again. And the feeling is naturally stronger in the case of blood-relations than in any other. I make this suggestion to ward off the imputation of pride which has been cast at Kant. To be ashamed of his relations because they were poor working people would have implied a vulgarity totally alien to the nature of a man who freely mixed with all classes. To those who can understand the feeling referred to, which does not depend on difference of social position or even on intrinsic intellectual superiority, the imputation of pride in any form will seem altogether gratuitous. Still, whatever the cause, it is to be regretted that Kant laid himself open to these imputations by his conduct, though he made amends for any personal neglect by the material support he afforded his relations. It should not be forgotten that later, and especially during the last few years of his life, as we have seen, even the personal intercourse was renewed.

Kant's tastes were least developed on the side of art. We hear little of any interest in painting, while music he regarded as quite dispensable, seldom attending concerts, and, as far as we know, never the theatre. Among the German poets, Haller, Wieland, Lessing and Bürger were his favourite. He knew little or nothing of Goethe, and

of Schiller only the prose writings more or less immediately bearing on his philosophy. The above surprising circumstance is accounted for partly by the fact that the masterpieces of both poets appeared at the time he was busiest in the elaboration of his system, but this will not apply in the case of 'Faust,' which was first published in 1799, and for his supineness in neglecting to read one of the greatest poetic masterpieces, not only of Goethe or of Germany, but of any time or country, old age must be held responsible. Outside German literature his favourite authors, besides the Latin classics, were Locke, Pope, Hume, Hutcheson, Butler, among English, and Montaigne and Rousseau among French writers. Don Quixote was also a favourite book. Of Italian literature he knew little or nothing.

In early and middle life Kant was a great billiard and l'hombre player; but in his later years games failed to afford him any amusement. He had always a great partiality for satire, a direction in which he was himself not ungifted. He said that Erasmus of Rotterdam had worked more good with his satires than all the metaphysicians that had ever lived. His contempt for the English as a nation, always great, was enhanced as he grew older by the French war and the reactionary policy of the Pitt administration generally, which he regarded as tending directly to barbarism and slavery. When reproached with hating the English, he replied that he could not give himself so much trouble with regard to them. This strong antipathy is curious, as Kant counted more than one Englishman among his intimate friends.

The somewhat wide problem of Kant's attitude in political and religious questions is simplified by bearing in mind the fact that two souls dwelt in Kant's breast, and throughout his life were struggling for supremacy. The one was a soul of reverence for authority and tradition, the other

of devotion to justice and truth. In politics, while in theory fully recognising the great principle to which his century gave birth, i.e., the equal rights of man, in practice, he bowed before the *status quo* and deprecated revolutionary changes. Kant's interest in the course of the French Revolution was intense, though it is probable that even he scarcely realised the full importance of that great world-historic event. He was extremely averse to any foreign intervention in the affairs of France, and wished free play to be allowed in the working out of the great social and political problem on which the French were engaged. The basis of Kant's political theory was the separation of the legislative and executive powers in the state, and their rigid equilibration. The popular will being once embodied in the laws, the question of Monarchy or Republicanism he regarded as immaterial. This somewhat barren and unpromising conception is neither better nor worse than the rest of those current at a time when the social question was still subordinated to the political. It bears, indeed, a close resemblance to that formulated by Jean Paul Marat in his *Plan de Constitution.** The fact is, in political theory Kant's originality of genius forsook him. Like all other political theorists of the time, he was under the influence of Rousseau. Had Kant not allowed prudential motives to deter him from accepting the offer, indirectly made, of entering upon a correspondence with the Abbé Siéyès, much light would have been thrown upon his political opinions generally and especially in relation to contemporary events. Kant was an inveterate enemy of all feudalism, and a friend of all that he regarded as con-

* The stress is characteristically laid by Marat on the initiative and legislative authority of the popular voice and on the ultimate dependence of the executive on the popular will—by Kant, on the independence of the executive in applying laws once given.

ducing to freedom of the individual. Unfortunately, he never seems to have clearly formulated to himself the conditions of individual freedom. In economical questions his views were crude in the extreme. Schopenhauer is probably right in attributing to the weakness of old age what he justly terms "a strange interweaving of mutually-implicative fallacies," namely, the *Rechtslehre*. But Kant's immoral "non-resistance" doctrine is worse and far less excusable than his economic fallacies, and must continue an everlasting stain on the memory of the great thinker. Indeed, unwilling as we may be to admit it, we can hardly absolve Kant altogether from the charge of intellectual cowardice. It is not our purpose here to add another contribution to the interminable controversy respecting the changes made in the second edition of the 'Critique;' but it may be observed that Kant's most ardent defenders in this matter, however indignantly they may repudiate the language of Schopenhauer's strictures, are bound to admit the existence of an "apologetic tone" in the amended work, thereby conceding their substantial justice.

Our allusion to this topic leads us to Kant's relation to the religious question generally. Here again we find him countenancing only too often that wretched sophistry of the 18th century, according to which the truth is only for the elect few; which could accept with complacent cynicism an arrangement whereby all religions are equally true to the devotee, equally false to the philosopher, and equally useful to the statesman. It is true we have not a few glimpses of a nobler and more truly philosophic view of the goal of human culture; but, practically, Kant advanced but little beyond the standpoint of Voltaire and other 18th-century thinkers in this particular. Against this may be set off the fact that he never in his own person belied his convictions. He never, with all his obsequiousness

to authority, for form's sake practised the rites of any *cultus*, public or private. He never attended church, or otherwise, by word or act, implied an acquiescence in the current theology.* It must always remain a delicate question in how far Kant really believed in the necessity, nay, even the possibility, of a theology based solely on practical considerations, or in how far his doctrine on this point was dictated by subservience and a constitutional dread of the "subversiveness" of atheism, or any distinctively non-theological attitude. Is it credible that an acute thinker like Kant could regard, as a real foundation for the belief in any doctrine, a mere sense of its desirability, however strong, for so much and no more is contained in Kant's so-called practical necessity? For the present writer, it must be confessed, it is impossible to read the passages in which this principle is inculcated without the consciousness of a Mephistophelic smile lurking somewhere between the lines. Of course it is open to any one to call this an illusion, and yet the fact of such an effect being produced (the case in point not being singular), would seem to indicate a lack of sincerity, though possibly an unconscious one. The best, as it is certainly the most charitable explanation of Kant's attitude towards the "art of wholesome persuasion" (the phrase he uses to designate theology), is surely that above suggested, namely, that it only represents the most important phase of Kant's compromise between the conservative and revolutionary sides of his character (to wit, between the *dévot* and the *honnête homme*). What is here said does not of course refer to the basis of Kant's practical philosophy, namely, *noumenal* freedom and the

* Even when compelled, as rector of the university, to lead a procession of the senate to the cathedral, he would not enter, himself, but turned aside at the door.

eategorieal imperative, which there is no doubt that, rightly or wrongly, he regarded as integral elements in his system. The only point in doubt relates to the practieal sanctions. Granted that Kant conceived morality to be impossible apart from the doctrines of theism and immortality, did he believe, himself, or expect others to believe, in the objective validity of a proposition, merely because the interest of morality rendered its truth desirable? This is a question which has, as far as I am aware, never yet been boldly faced by Kantian scholars. The doctrine itself has been eritieised often enough, but the critics have mostly shirked the question as to whether Kant himself was, in the full sense of the word, sincere in his enunciation of it. As regards Kant's personal feelings on immortality, Jachmann relates that he once expressed an opinion to the effect that an eternal duration of consciousness would under any circumstances be a questionable boon.

It is needless to say we have only indicated in a few lines points in Kant's character and opinions that might readily have been expanded into chapters. In a general estimate of the intellectual and moral character of a thinker, it is of the first importance to bear in mind the conditions of thought in his time, and the particular aspect of the problems which confronted him. The greatest intellect is incapable of transcending the thought of its epoch; the most it can do is to develop and bring to light principles immanent therein, and this Kant did to an extent unsurpassed by any other man. In philosophy he found a narrow psychological point of view and a barren scholastic metaphysics prevalent, and from these unpromising materials educed an entirely new way of approach to the great problems of philosophy. In science he enunciated, if he did not formulate, the doctrine of evolution merely from the scientific data at his disposal, and without a hint from extraneous sources. In practical questions Kant's

circumstances, and the habits of life and thought thence acquired, accustomed him to look at things from a too exclusively academical standpoint. He lacked, moreover, the breadth of view acquired by travel. In his views of subordination to constituted authority we see reflected the rector of the university maintaining order among a host of students and subordinate dignitaries. It is, in fact, pedagogy carried into the sphere of politics. We must remember, however, in considering Kant's theories of government, that the great social problem was only just beginning to loom above the political horizon even in Kant's old age, and hence that it is not surprising if his views on economical and social questions generally should be comparatively worthless at the present day, when such questions have for more than half-a-century occupied a place of growing importance. Kant's attitude toward all great practical questions is also in large measure accounted for by the fact that the formulation of the conception of evolution as applied to human progress, the crowning achievement of 19th-century thought, dates from a period long subsequent to the great thinker's death. No hint of a science of sociology existed, and it was not given to Kant to found one, great and essential as were his contributions to its origination. Art, again, had not in the 18th century acquired the importance of a primary element in culture which it possesses to-day. Music, the art in which the æsthetic sense of the modern age is pre-eminently embodied, was little better than the afterdinner amusement of princes and nobles—a mere sensuous entertainment and nothing more. It was in the latter light that Kant viewed it, and more or less all forms of art, and hence it is not a matter for wonderment, if Art was not a thing of serious human interest to him. We now pass on to a closer consideration of Kant's position as a philosophic thinker.

KANT'S POSITION IN PHILOSOPHY.

The three great epochs in modern philosophy are characterised respectively by the names of Descartes, Locke and Kant. Of these epochs, that inaugurated by Kant is the one to which the thought of our own day may be said to belong, and this in more than a special sense, for the influence of Kant is almost as deeply visible in the general current of speculation as in philosophy proper. There is, indeed, scarcely a doctrine or portion of modern science or controversy, the germ of which is not to be found in Kant, hazarded, it may be, in the form of a mere idle fancy, but unmistakably there. Kant was a Titan alike in the range and depth of his knowledge, as in his almost unequalled and certainly unsurpassed intellectual grasp. The only other thinker in the world's history who can be deemed worthy of a place beside him for this all-but unique combination of qualities is perhaps Aristotle. But the results of the Königsberg philosopher's labour have been incomparably richer than even those of the Stagirite. The works of the latter thinker may constitute an encyclopædia of ancient thought, but neither his own successors nor the ancient world generally showed any capacity for developing the hints and speculations thrown out by him. They became an oracle of appeal for his followers, of which the meaning was to be elucidated, but so far as any capacity for organic assimilation is concerned they fell upon barren ground. Ancient philosophy practically reached high-water mark in Plato and Aristotle. No real advance was made upon these thinkers. With Kant the case is different. He stands at

the commencement instead of the culmination of an epoch. Though he also brought to a focus the speculation and research of his predecessors; the intellectual ferment of the 19th century lay before him, and it was in this fruitful soil that his doctrines were destined to germinate. With none but 18th-century materials he founded 19th-century thought. The Kantian system, as propounded by Kant, is too full of contradictions ever to become petrified into a code of phosophical dogma. It steadily refuses to crystallise. Many positions equally insisted upon fail to blend with one another, notwithstanding the profusion of ingenuity that has been lavished in the attempt to make them do so. This applies almost as much to the general bearings of the system as to its special points and technical details. Idealist and realist, theist and agnostic, severally draw from Kant's writings arguments and expressions of approval for their respective standpoints; but no one has yet succeeded in placing the Kantian system as a whole beyond the reach of criticism. Hence, no two Kantians can be found to agree in its interpretation, one accentuating one line of thought and one another. The reason of this lies in the untrodden nature of the ground he was exploring.

There is no trace of Kant's ever having studied Spinoza at first hand, though he unquestionably took up the mantle of the author of the *Tractatus theologico-politicus*, in matters concerning Biblical criticism and the free expression of opinion in theology and politics. The thinker with whom Kant was most in contact at the outset of his philosophical career was Leibnitz, especially through the medium of the Leibnitzians Wolff and Baumgarten. He subsequently entered on a thorough study of the English philosophic dynasty—Locke, Berkeley and Hume. He appears also to have had some acquaintance with the Scotch psycholo-

gists, Read, Beattie, etc. Thus he became versed no less in the English empiricist, than in the dogmatic-metaphysical school then uppermost on the continent. It was Hume, he says, who first broke his dogmatic slumber with his statement of the causation problem. With no one is it more important than with Kant to bear in mind the sources whence the start was made on the philosophical voyage of discovery, a neglect of this rendering many elements of Kant's thought well nigh incomprehensible. It cannot be too much insisted upon that in the 'Critique' two distinct lines of philosophic thought meet, but fail to coalesce satisfactorily.

The phenomenalism and scepticism of the British school appear uppermost at one time, while at another, repudiation of Berkeleyan idealism, and protestations as to the necessary existence of a world of *things-in-themselves* reveal the former disciple of Leibnitz and Wolff. A few words on the philosophy then dominant in Germany may be desirable to facilitate an appreciation of the influences under which Kant started.

Leibnitz had sought to bridge over the Cartesian dualism between matter and spirit by his hypothesis of an intelligible world as expounded in the 'Monadology,' and by the celebrated doctrine of a "Pre-established harmony." The monads of Leibnitz may be described as spiritual atoms in contradistinction to the material atoms of the ordinary atomistic doctrine. They were infinite in number, unextended and possessed of various degrees of consciousness. These immaterial essences were thus subjects capable of receiving impressions, the differences between them consisting in the relative clearness or confusion of these impressions. A material body is an aggregate of monads, which, owing to our confused consciousness, is presented as a continuous whole. Minerals and plants consist, so to speak, of sleeping monads, whose

impressions do not reach the *niveau* of consciousness. The order of impressions or presentations, i.e., the subjective order, in each monad is determined by an immanent causality; but the objective relations of the monads among each other by a purely mechanical causality, the system of pre-established harmony, effecting and regulating the correspondence of these two orders with one another. Christian Wolff, while adopting the Leibnitzian positions in the main, endeavoured to reconcile them with the older Aristotelian system of the schools, and to reduce their somewhat confused statement to scholastic form and precision. This endeavour, if successful in its immediate object, was so at the sacrifice of all that gave to the system its plausibility and attractiveness in the hands of its author. Wolff is nevertheless saved from oblivion by Kant's employment of his terminology and classification. Wolff divided philosophy into Ontology, or the science of being in general; Psychology, or the science of the soul as a simple substance; Cosmology, or the science of the material universe; and Theology, or the science of the existence and attributes of the Deity. The traces of this division in the Transcendental Dialectic are apparent on its very surface.

While Wolff, Baumgarten and their disciples in Germany were thus engaged in developing the principles and following the abstract and dogmatic method propounded by Descartes, on the lines of Leibnitz (Spinoza's monism remaining a dead letter to his immediate successors no less than his contemporaries, except for an occasional polemic) another and very different view was being worked out in this country. Hobbes and Locke had successfully applied the inductive method laid down by Bacon to the problems of empirical psychology, and more than hinted at the nescience of human knowledge of all save the phenomena immediately present in consciousness. Berkeley

had carried these principles to their logical issue on the one side, in denying a matter other than the qualities known to us, and the existence of which is equivalent to their perception by a mind; while Hume had developed the equally logical thesis on the other side that the word "mind" itself merely denoted a succession of impressions and ideas, and had thence argued that our notion of causality is solely the result of habit, and therefore limited in its application to experience.

In France the great materialist and sensationalist school held sway, and its echoes probably reached the shores of the Baltic. The reason Kant makes little direct allusion to it, is not unlikely to be that he regarded it as an extreme one-sided off-shoot of Lockeian empiricism. The German *Aufklärung* of Basedow, Reimarus, etc., affected the current of philosophy proper but slightly. Two fundamental lines of thought were thus at this time visible—the German dogmatic-metaphysical, and the English empirist-sceptical, with its dogmatic pendant, the French materialist.* These two principal lines met in Kant, and their respective doctrines were destined to be resolved in his critical crucible. Idealism and Materialism, supposed to be irreconcilable, were to be exhibited as merely diverse aspects of one problem, the solution of which, if to be found at all, must be sought for in a higher synthesis. Their respective pretensions to "pluck out the heart" of the mystery of existence were to be disposed of; dogmatism of every kind was to receive its death-blow, and the first real attempt (because the first which adequately recognised the strength of its position) be made to grapple with philosophic scepticism. Kant's system is comprised in three treatises, the 'Critique of the Pure Reason,' the 'Critique of the Practical Reason,'

* Berkeleyan idealism and French materialism may be regarded equally as antithetical dogmatic offshoots of English Empiricism.

and the 'Critique of the Faculty of Judgment'—the first of these dealing with the origin of Knowledge, the second with the criterion of Ethics, and the third with the data of Æsthetics. The fundamental task of the 'Critique of the Pure Reason,' immeasurably the most important of the three, is to reduce conscious experience to its elements. It is in no sense intended as a treatise on psychology. Psychology deals with the objects or phenomena given in internal experience and their relations, just as the natural sciences deal with the objects or phenomena given in external experience and *their* relations. The purpose of the branch of philosophy founded by Kant, and of which the 'Critique' is the organon, is to inquire into the conditions of consciousness, and not to analyse its content, whether external or internal. He termed it *Erkenntnisstheorie*, or "Theory of knowledge," its problem being to discover how knowledge is possible? Psychology started from consciousness as a given fact, without inquiring as to its genesis. The old dogmatic metaphysicians applied its conceptions as they listed without, no less than within, the region of possible experience. Kant cried, "hold!"—the first duty of philosophy is to inquire at once into the credentials of experience, and of the conceptions that profess to transcend it. The question, as propounded by him, was accordingly, "How are synthetic propositions *à priori* possible?" His own solution of this momentous question, which has revolutionised the whole of philosophy, is contained in the 'Critique.'*

We have more than once spoken of Kant's "system," though it must be remembered that Kant formulated no system in the old sense of the word, namely, as

* When the word 'Critique' is used alone throughout the present introduction, the 'Critique of the Pure Reason' is to be understood.

implying a body of doctrines concerning speculative questions in general. This is acknowledged under the title of the *Prolegomena*. Kant claimed to have founded and elaborated the science of Criticism, as a special philosophic discipline (to use the old expression), which was to constitute the *propædeutic* to every other philosophic discipline, but not to have attempted a definite solution of the problems of philosophy. The Kantian system, then, is one of criticism. It is concerned with the elements and modes of cognition, the synthesis of which we term experience, or in other words it is a critical investigation into the primary conditions of our knowledge. We may remark that there is also another and a secondary sense in which Kant's system is critical. As Dr. Vaihinger observes, "Kant's 'Critique,' more than any other work arose out of polemic, and hence consists in such." As a natural consequence, any explanation of the 'Critique' must largely occupy itself in tracing each doctrine and discussion to its historical source. But to a right understanding of Kant, it is not only necessary to trace the pedigree of every principle; it is also necessary to follow its subsequent development in the post-Kantian philosophy. The elementary constituent of every post-Kantian system is to be found in the 'Critique,' in the form of some principle implicitly or explicitly given, and this is in many cases first seen in its full bearings in the system into which it developed.

It does not lie within the scope of the present introduction to add one more to the many condensed expositions of the 'Critique' already before the world. At the same time, a brief notice of one or two of the leading points in dispute, together with a rather more extended examination of one of its fundamental principles, may not be out of place, or without an interest for the student of Kant. It is of the utmost importance to

remember that "knowledge" or "experience," in a critical sense, does not mean knowledge or experience in the individual *quâ* individual, which is a matter concerning empirical psychology; and that Kant's object is not to trace the origin and progress of knowledge or experience in the individual mind, but to discover the elements which go to make an experience in general,—or in other words, objectivity itself—possible, without which no such thing as individual experience could exist at all, but yet which lie concealed in individual experience.

Kant's main question may be split up into two: I. How is pure Reason possible? II. How is experience possible? These questions severally recall the dogmatic and empirical sides of Kant's philosophic training. Kant had to show the dogmatists that the possibility of *à priori* cognition presupposed experience. He had to show the empiricists that an *à priori* element lay concealed in experience itself. Experience and Reason, according to Kant, mutually condition one another. The inchoate matter of feeling receives its form from the *à priori* Reason and the world of conscious experience arises. True cognition *à priori* implies experience, while experience, in so far as it is necessary and universal (in other words, objectively valid), implies cognition *à priori*. Hence Kant's answer to the above question was, pure Reason is possible in and through experience, and experience is possible by means of a system of pure conceptions, conditioned by an *à priori* unity, or, in other words, through pure Reason.

The respective positions of Dogmatism, Empiricism and Criticism, with regard to the problem of the origin of knowledge, may be expressed in terms of the old scholastic controversy. Dogmatism assumed the forms of a *consciousness in general* as obtaining apart from and independently of the particular consciousness of the individual (the

extreme realist position, *universalia ante res*). Psychological Empiricism denied these forms any standing, otherwise than as abstract notions derived from individual experience of particulars (the extreme nominalist position, *universalia post res*). Criticism re-affirmed the universal forms of conscious experience in general, apart from the particular consciousness of the individual, but only, in and with reference to, some such individual consciousness (*universalia in rebus*). The above affords us an illustration of how old and apparently barren controversies reappear in the evolution of thought, so metamorphosed, and with such an infinitely richer content, as to be hardly recognisable.

Kant's statement of the theory of knowledge, it is scarcely necessary to remind the reader, falls into three divisions. The first, the transcendental Æsthetic, deals with the Sensibility, the receptive element, which intuites the as yet blind matter of feeling under the forms of space and time; the second, the transcendental Analytic, treats of the Understanding, the active element, which contributes to the material furnished by sense its own categories or conceptions; the third, the transcendental Dialectic, is concerned with Pure Reason, which through its ideas extends the conditioned, actual experience attained by means of the former, unconditionally.

A good instance of a typical English misconception of Kant is to be found in Mr. Herbert Spencer's 'First Principles' (p. 50), where an attempt is made to crush Kant by attributing to him an inconsequence hardly possible with the merest tyro in philosophic thought. "If," says Mr. Spencer, "space and time are the conditions under which we think, then when we think of space and time themselves, our thoughts must be unconditioned; and if there can be unconditioned thoughts, what becomes of the theory?" Now, it so

happens that Kant did not claim space and time as conditions of thought, but of sensuous intuition. Thought, moreover, in the sense of the passage quoted, namely, empirical reproductive thought, lies altogether outside the range of Kant's inquiry, which is concerned with the genetic origin of cognition, and not with its empirical character. Space and time, he might have answered, we can, indeed, only think of reproductively as abstractions; it is only thus that they can become objects of empirical thought. But this does not touch the critical position. The possibility of their *re*production *in* experience in the form of abstract notions does not invalidate the claim for them to be *à priori* conditions of the possibility of the original *pro*ductive synthesis *of* experience. We have here an instance of how the most eminent representatives of the typical English school beat the air in attempting to combat Kant.

Much has been written on the relation of the "Understanding" to the "Reason," in the critical philosophy. There is no doubt that the difference as conceived by Kant was more one of function than of structure, although his utterances on this point are by no means always clear or even consistent. As Schopenhauer points out, there are passages intended to be elucidatory in which the distinction sought to be established is so wiredrawn as to be hardly intelligible. The function of the understanding is out of perceptions to construct cognitions or experience. This it effects by imposing upon them its pure conceptions or categories, or, in Kant's language, "subsuming" the forms containing the perceptions (viz., space and time) under these. Kant thus appears to overlook the fact that mere perception itself involves the category. Perception, he says, which is purely subjective, merely presupposes the primitive unity of the consciousness, together with the laws of the connection of perceptions therein.

Knowledge, cognition or experience, on the contrary, which passes beyond the mere subjective connection of the perceptions, ascribing objective reality and a definite objective order to the presentations contained in them, presupposes the categories. The essence of objectivity is, in fact, space, and the dynamic categories. The function of the "Ideas of the Reason" is, according to Kant, "to posit the unconditioned possible to the conditioned actual." But the realm of the Pure Reason, in Kant's sense, is purely "regulative." It is a determination of the pure conceptions of the understanding in a particular manner, the objective validity of which, and of the propositions based upon it, is assumed on "practical" grounds. The "Ideas," in short, are not constitutive of experience. Their reality is not implied in the nature of cognition in general, like the categories or the pure forms of space and time. They are outworks, as it were, of the main edifice of the theory of knowledge, giving symmetry, perhaps, to the form the structure assumed in Kant's hands, but hardly indispensable to it even in his case.

The great battleground in the critical philosophy is unquestionably the problem of the relation between the Thing-in-itself and the phenomenon present in consciousness. That Kant himself is by no means clear as to his own position in the matter is evident. On this ground the principles of dogmatism and scepticism have, in fact, contended for possession of the critical philosophy, both in the person of the Königsberg sage himself and his successors. A clear and correct view of the significance of the *Ding-an-sich* in Kant's system would go a long way toward settling all other questions with regard to it. The *noumenon*, or thing-in-itself, is the point of contact between "theory of knowledge" and ontology. In the critical philosophy it appears in three forms; I. as the unconditioned object of the internal sense; II. as the un-

conditioned object of the external sense; and III. as the unconditioned object in general, the *ens realissimum* or Absolute. In briefly considering these several aspects of the Kantian *Ding-an-sich*, we will take the second and third in order first, a procedure the desirability of which will become apparent in the course of our investigation.

In the transcendental Æsthetic, by reducing space and time to the subjective forms of the Sensibility, Kant logically carried out the position taken up, but imperfectly developed, by Berkeley, that all perception is just as much affection of a conscious subject as the sensations of pleasure and pain, and just as little entitled to be regarded as obtaining outside consciousness. But at this point Kant diverged from Berkeley. Besides contending that the forms of experience in general (as opposed to that merely referable to the individual mind) namely, space and time, together with the categories, give external reality to the presentation in the only sense in which we understand the expression, he assumed, somewhat inconsequently, the existence of a world of unknown and unknowable things-in-themselves, as giving rise to the material element in the affections of sense. The conception of objects as *phenomena* supposes the existence of things-in-themselves, or *noumena*. Without the reference of the empirical object to a non-empirical object—of the appearance to a thing of which it is the appearance—the word phenomenon itself would lose all meaning, there would be nothing, philosophically speaking, to distinguish it from sheer illusion.* That which gives material as opposed to formal reality to the empirical object is its necessary reference to a thing or object *in itself*. We

* A view diametrically opposed to the one before mentioned, which makes space and the categories the conditions of external reality in the only intelligible sense of the word.

may term this non-empirical object of the outer sense the cosmological *thing-in-itself*, to distinguish it from the two other forms in which the thing-in-itself appears in Kant, and which may be characterised respectively as the psychological and the theological thing-in-itself. It is worthy of note that the cosmological thing-in-itself is frequently spoken of as plural by Kant. Phenomena are said to imply things-in-themselves, the obvious inference being that to each empirical object there corresponds a non-empirical. Now as will be seen this reference to individuation and number, which, as implying space, time and the category of quantity, should, on Kant's principles, apply exclusively to phenomena, to the unknown ground outside phenomena, is an obvious inconsequence. Individuation and plurality imply limitation in time, or space, or both. Can we ascribe such a glaring inconsistency to a mere carelessness of language? The more probable explanation seems to the present writer to be that we have here an indication of the fact that Kant was still haunted, even in his critical days, by the Leibnitz-Wolffian monads, and that in the cosmological things-in-themselves, the *noumena* which affect the external sense, we may see a survival of the Monadology. Kant doubtless disengaged himself with difficulty from his old philosophical associations, a circumstance which here, as elsewhere, prevented him from clearly grasping the import of his own doctrines. But, whatever the explanation, the fact remains that Kant never fully realised that the exclusive subjectivity of space and time, the sources of individuation, must necessarily preclude the assumption of individuation in the *noumenon*.

A further inconsistency is traceable in Kant's doctrine of an objective world of *noumena*. The noumenal object is continually referred to as the *cause* of our sense-presentations, a transcendent application of the category of cause

and effect, hardly less reprehensible on critical principles than the one above mentioned. Kant's subjectivism is at times too strong to admit of any *via media* between the dualism implied in this conception and a thoroughgoing illusionism; for the *via media* of Monism was not for him, but his successors. As a consequence, whenever he thinks it is landing him in the quicksands of absolute illusion, he clutches desperately at this problematical straw of an objective world of things-in-themselves. Throughout the whole system the struggle between the two points of view—phenomenalism and dogmatism—is maintained.*

The thing-in-itself, as the ideal of the Reason, stands at the opposite pole of the 'Critique' to the thing-in-itself as transcendental object. It is admittedly not an assumption necessitated by the nature of cognition in general, but a "mere idea." Though the culminating "idea" of the Pure Reason, it is no more than an "idea." The cosmological things-in-themselves, on the other hand, only appear in the domain of the Reason, indirectly, viz., as affording a basis for the idea of freedom, the antinomies furnishing a kind of *reductio ad absurdum* of the claims of nature to be more than empirically valid. In its objective or cosmological aspect, the *noumenon* appears as an infinite plurality; in its Ideal aspect as an infinite unity. If in the one we have an echo of the Leibnitz-Wolffian monads, in the other we are recalled to the One Substance of Spinoza. It is undeniable that both points of view are alike remnants of the old transcendent or dogmatic metaphysics. Notwithstanding that Kant's acquaintance with the system of Spinoza was merely secondhand and superficial, the first two of the following passages are scarcely distinguishable from Spinozism. Kant defines the Ideal object as a "tran-

* The most emphatic utterances on the realistic side, in a cosmological sense, are contained in the remarks appended to the first division of the Prolegomena.

seendental substratum" lying "at the foundation of the complete determination of things—a substratum which is to form the fund from which all possible predicates of things are to be supplied," in short, as an "ideal of a sum total of all reality." "In this view," continues Kant, "negations are nothing but *limitations*—a term which could not with propriety be applied to them if the unlimited (the all) did not form the true basis of our conception" ('Critique,' p. 355). "The conception of an *ens realissimum*," says Kant, "is the conception of an individual being, inasmuch as it is determined by that predicate of all possible predicates which indicates and belongs to *being*." The course of the exposition shows a progressive development on the theological side, till we arrive at the theistic idea in its complete form. "We proceed to hypostasise this idea of the sum total of all reality, by changing the *distributive* unity of the empirical exercise of the understanding into the collective unity of an empirical whole, a dialectical illusion, and by cogitating the whole or sum of experience as an individual thing, which stands at the head of the possibility of all things, the real conditions of whose determination it presents" ('Critique,' p. 339).

In Kant's exposition, the conception of a sum total of reality mingles itself in a rather vague manner with that of a first cause. In a note to the passage last quoted, Kant adds: "This ideal of the *ens realissimum*, although merely a mental representation, is first *objectivised*, that is, has an objective existence attributed to it, then *hypostasised*, and finally, by the natural progress of the Reason, *personified*, as we shall show presently. For the regulative unity of experience is not based upon phenomena themselves, but upon the connection of the variety of phenomena by the understanding, and a *consciousness*, and thus the unity of the supreme reality seems to reside in a Supreme Under-

standing, in a *conscious intelligence* ('Critique,' *ibid.*). Kant then proceeds to demolish the traditional arguments for the existence of a Supreme Being, which start from the assumed validity of these conditions of experience outside the range of experience, in other words, from their transcendent application. The theistic idea, being thus deprived of all dogmatic character and objective reality, is reduced to the mere conception or ideal for the regulation of the theoretical Reason in its investigations into Nature, which is to be regarded *as though* it were the work of a Supreme Understanding and Will; and of the Practical Reason in life, which is to be conceived *as though* it were under the superintendence of an all-wise and all-just Ruler. As to the nature and extent of the debt Kant claims theology to be under for this attenuation of its fundamental doctrine, theologians may be left to decide.

The *noumenon*, under all the forms in which it appears in Kant, is characterised by certain unmistakable features. It is throughout defined as an intelligible object, that is, one which, if it is to be cognised at all, must be so, in and through the understanding without any sensuous medium. It is further described as a boundary conception, the analogy being drawn from geometry. Just as the point, line and superficies cannot be constructed *in* actual space, because they severally exclude in definition one or more of the dimensions of space, but at the same time serve as boundaries *of* actual space; so the *thing-in-itself*, although it can never be given *in* any experience, external or internal, inasmuch as it excludes by its definition all the predicates drawn from experience, serves, nevertheless, to mark the boundaries *of* experience, to indicate the unknown quantity, the X., which experience presupposes.

An objection has been raised and is much insisted upon by Ueberweg (*Geschichte der Philosophie*, Band iii., p. 185,

note) and Volkelt (Kant's *Erkenntnisstheorie*, pp. 44–50), that Kant in excluding the formal conditions of experience from the *thing-in-itself*, trenches in a negative sense on the incognisability of the latter. In asserting, it is said, that space and time, inasmuch as they are the forms of our sensibility, *cannot* obtain in objects as *things-in-themselves*, he is assuming a dogmatic attitude with regard to it. To this we would observe that, admitting the apodictic phraseology used, negative though it be, to be technically inconsequent, the inconsequence is not more than technical. Kant's aim is to show that we have no grounds for ascribing any of the qualities of the sense or phenomenal world to the intelligible or noumenal world. Granting him to have been successful in this, all that the objection amounts to is that he failed to use language sufficiently guarded to admit the technical contingency that among all possible contradictory modes of existence this one is included. But inasmuch as this possibility is only as one against infinity, the error can have no material significance whatever. It is nevertheless curious that Kant should not have recognised it, as he is sponsor for "possibilities" of this nature when hard-pressed on the practical side of his philosophy.*

It must be apparent to every student of the 'Critique' that the three aspects of the *noumenon*, the three sets of *noumena*, as they have been called, altogether fail to harmonise with one another. Their mutual relations are throughout completely undetermined. The connection of the cosmological with the psychological *thing-in-itself*, and of either with the ideal *thing-in-itself*, the *Ens realissimum*, or Absolute, is nowhere indicated. Are we to understand Kant as really implying a quantitative or

* It is in virtue of these possibilities introduced by Kant that respectable persons in the present day can ward off the charge of Atheism, by sheltering themselves under the *ægis* of Agnosticism.

qualitative distinction, or both, or are the differences merely due to the diverse points of view from which he is regarding one conception? These are questions which may occupy the student of Kant for some time to come. That Kant was, in the modern sense of the word, a Monist, is however, extremely improbable, the passages sometimes supposed to show a monistic tendency being more naturally interpretable otherwise. It is worthy of note that, while transcendental reality is asserted of the constitutive aspects of the *thing-in-itself*, i.e. the psychological and cosmological *noumena*—although all knowledge of this reality is denied; with the purely regulative aspect (i.e. ideal of the Reason) conversely, the reality is denied, although its nature as a mere idea is asserted to be fully determinable. In the one case the stress is laid on the *reality*, in the other on the *determinability*, in accordance with the supposed requirements of the Reason. The "ideas" all have a practical reference, are *maxims* rather than *principles*, and as such do not touch the real import of the *thing-in-itself* as a theoretic datum in the critical philosophy. While the cosmological and psychological *noumena* form an integral element in the structure of the 'Critique,' the theological Absolute is merely the crowning of the edifice. Immortality, Freedom, God take their rise in the fact that the practical Reason may assume what it likes respecting that of which the Pure Reason asserts the bare predicate of existence and nothing more. A consistent carrying out of the idealistic and sceptical element contained in Kant's thought would have led to a declaration of our complete nescience, even of the bare existence of anything beyond our own presentations and thoughts, and the laws of their unity in consciousness. But Kant's purpose was other than that of restating empiricism; only the enormous mass of raw material he had to deal with rendered consistency impracticable. He discovered the

ore, forged the tools, and indicated the process by which it was to be worked, but the complete "opening up" of the mine exceeded the powers of its discoverer, even though he was a Kant.

The furthest point we reach on critical principles in our investigation into the sources of knowledge is the transcendental subject at its basis. The original synthetic unity of consciousness is to be distinguished from the quantitative categorical unity (which is opposed to plurality and totality), inasmuch as it is from the former that the categories themselves are deduced. The assumption of a soul or thinking principle in the individual is only due to the dialectical illusion by which the original synthetic unity is hypostasised. The "internal sense" only shows us ourselves as we *appear*, not as we *are*. The *ego* in itself can never be known, but only its states. Hence both the idealist and materialist hypotheses are alike inadmissible. The reduction of the extended or material world to a mere mode of the unextended or ideal world is as fallacious as the converse procedure. Both orders of phenomena, the inner and the outer, are equally fundamental data of experience, incapable of any legitimate reduction into terms of one another. Feelings, thoughts and volitions are as much *phenomena* of experience as the presentations called external. But the *thought* or *feeling* is no more identical with *that which has* the thought or feeling than is the outward presentation. What it is which thinks, feels, perceives, etc., we can never cognise. The material or objective order, and the immaterial or subjective order remain irreducible factors of conscious experience or cognition in all respects but one—they equally presuppose a self-centred fact to which they are, in the last resort, referable. This fact of *I-ness* or *Egoition* is thus the primary condition of all possible experience. It must be distinguished from the synthetic unity which is

merely formal, as well as from the internal sense. "The subject of the categories cannot therefore, for the very reason that it cogitates these, frame any conception of itself as an object of the categories; for to cogitate these it must lie at the foundation of its own pure self-consciousness—the very thing that it wishes to explain and describe. In like manner, the subject in which the representation of time has its basis cannot determine, for this very reason, its own existence in time" ('Critique,' p. 249). Notwithstanding this, the postulate at the foundation of the forms of sensibility and the categories is given immediately in consciousness as, to use Kant's expression, "a feeling of an existence without the least conception." I am conscious not of *what* I am, but *that* I am, as the seat of phenomenalisation, or, more clearly, that something fundamentally the same as this "I" is that in and for which alone phenomenalisation can take place. In the indication of this fact we see the germs of the Monism of modern thought; but it remains a germ. The most (apparently) monistic passage in Kant occurs in the section in the paralogisms ('Critique,' p. 252) where Kant is discussing the community between the subjective and the objective orders, or, in terms of the old psychological formula of the "soul with the body." The difficulty, he observes, consists in the supposed heterogeneity of the two orders; "inasmuch as the formal intuition of the one is time, and that of the other, space also. But if we consider," he adds, "that both kinds of objects do not differ internally, but only in so far as the one *appears* externally to the other, consequently that what lies at the basis of phenomena, as a thing-in-itself, may not be heterogeneous, this difficulty disappears." Here we certainly seem to have indications of a monistic point of view, but from the context, and especially what follows relative to a "community of substances," it is evident that qualitative, not

quantitative homogeneity is meant; in other words, it is evident at once that the psychological formulæ still retain their hold on Kant, and that the spell of the Leibnitzian monads has not been dissolved.

The only point of community, then, between the internal and external orders of phenomena lies, if the foregoing be admitted, in their both being conditioned by an *ego* under the form of time. This is the central condition of phenomenalisation. It is plain that this *foundation* of all consciousness, whether of subject or object, cannot be identified with either "mind" or "matter," both of which are terms designating sets of phenomena *in* consciousness. The old mode of stating the problem as to the possibility of two dissimilar substances, soul and body, thought and extension, furnishing the unity of man and of consciousness, ceases to have any meaning when we recognise them to be not substances, but mere phenomena of *that which becomes conscious*, i.e. the primal condition of the synthesis of experience. To the question, whether there is such a thing as matter without mind, or mind without matter, the answer is, matter is a name for a class of feelings connected by certain categories under the form of *space* as well as time; mind is a name for another class of feelings connected by those categories under the form of *time* alone; that each class constitutes an integral element in the whole Conscious Experience, and hence that mind or soul (a thinking subject) apart from material conditions, is philosophically as absurd a notion as matter (an extended object) apart from its perception in a consciousness, either hypothesis involving self-contradictory assumptions. *That which becomes conscious*, in other words, the *possibility of a consciousness in general*, regarded *materialiter*, must be genetically prior to the individual consciousness and the formal conditions at its foundation. The principle in question, considered *in itself*, in short, must be independent

of space, time and the categories, with the formal unity at their basis; in other words, independent of individuation whether of subject or object.* Objection may thus be taken with reason to the term transcendental *subject*, as used in this connection, inasmuch as the fact in question stands *outside*† the differentiation of subject and object which implies the foregoing conditions. It will be seen, therefore, that on this view, Kant's transcendental object disappears, as based at bottom on the old dualist fallacy so severely criticised by him on other occasions; the abstract *ens realissimum* ceases to have any significance in a philosophical connection, while the transcendental subject itself loses the specially subjective character assigned to it by Kant. owing to his inability to free himself from the psychological method. We thus arrive at a pure Monism distinct alike from Spiritualism, Materialism and Dualism.

It is becoming more and more recognised by philosophers and philosophic *savants*, that no justifiable break can be made in our interpretation of objective phenomena; that just as we infer a mind in the case of other men and the higher animals (interpreting the phenomena in terms of our own consciousness), so we must infer all matter whatever to involve a mental side analogous in kind to, however differing in degree from, our own consciousness. The late Professor Clifford, the best-known exponent of the view in question in this country (a view more or less implied in all the post-Kantian

* To put this somewhat differently: the conscious *ego* is only the formal determination of *in*-ness in time. The fact of *in*-ness, or existence *in and for* itself, is implied in this very fact of *conscious egoition*—or, as Kant has it, the transcendental unity of apperception—from which the notion of objective reality itself is ultimately deducible. (See section on "Deduction of Categories," 'Critique,' first ed.)

† I prefer this expression to *above*, which seems to indicate a superiority of the *thing* or fact *in itself* to the *thing* or fact as phenomenon.

systems of Germany, especially in those of Schopenhauer and Hartmann), writes, "we may assume that the quasi-mental fact, which goes along with the motion of every particle of matter, is of such inconceivable simplicity as compared with our own mental fact, our consciousness, as the motion of a molecule of matter is of inconceivable simplicity when compared with motion in our brain" (Essay on "Body and Mind").* This mode of statement is unimpeachable as far as it goes, expressing, as it does, a logical consequence of the doctrine of evolution; but when the thesis is put forward (as is done by Professor Clifford) in the sense of an ontology, it is open to the obvious objection that it is a generalisation respecting phenomena alone, and, although embracing the totality of phenomena within its pale, does not deal with "things-in-themselves." Like all pluralistic pseudo-ontologies it assumes the conditions of experience, space, time and individuation, i.e. the very points an ontology (assuming such to be possible) ought to explain, and is thus no ontology at all. It is obvious that an ultimate ontological postulate must lie outside the differentiation of subject and object with the conditions involved therein. The monistic view forces us to regard the whole of nature, or the external world, in other words, matter in all its forms, from inorganic upwards, as simply a transfigured representation in the complex forms of our sensuous consciousness of the momenta of the one transcendental fact or thing-in-itself at its basis, of which, in the words of Kant, we have "the feeling of an existence without the least conception." This transfigured sense-world, it may be observed, is re-transfigured in abstract thought in the shape of the generalisations of science and philosophy. Nature, if the foregoing be admitted, with

* For a detailed statement of the, perhaps not very happily designated, "mind-stuff" theory, see the essay "On the nature of things-in-themselves."

its great evolutionary stages, the atom, the molecule, the cell, the organism, is simply the phenomenalised unfolding of a timeless transcendental process. The difficulty of apprehending this is owing to the impossibility of placing ourselves, fixed in a highly complex consciousness, at the subjective standpoint of lower forms of being. We cannot represent to ourselves that the externality or world present to the quasi-consciousness of the zoophyte or crustacean is something *toto-cœlo* different from our world in which we cognise the zoophyte or the crustacean. The whole scale of nature is unrolled before us as object, but as object only—as subject-object our knowledge of it is rigorously bounded by our own place in the scale. As an individual then, on the one side a synthesis of thoughts, feelings and volitions, and on the other, of cells, tissues and organs, I am a phenomenon amongst phenomena, but that which feels, thinks, cognises, etc., whether in me or the monad or the molecule, is transcendentally indistinguishable from the incognisable if intuitable *self* constituting the *material* postulate at the basis of my (our) own *formal* self-consciousness.

Fichte was the first among Kant's followers to show that his master's teaching, when logically carried out, led to a transcendental Monism of this description; but it forms the basis of all the more important post-Kantian philosophies of Germany. Professor Adamson observes, relative to Kant's position as a thinker: "In the Kantian system, the problems of speculation were taken up in the form presented by the antecedent popular philosophy—a form essentially limited in scope—and it was therefore matter of some difficulty to discern the real import of the new treatment to which they were subjected. One may even say that from Kant himself the significance of much of his work was concealed by the limited and partial character of the questions which presented themselves to

him as the essential problems of speculative inquiry. In the critical philosophy can be traced the somewhat narrow psychological method characteristic of modern thought to the larger view of speculative problems which recalls the work of the Greek thinkers. The analysis of human knowledge, which had been for Locke and his successors the sole function of philosophy, appears in the critical system as part, though an essential part, of the more comprehensive inquiry dealing with the whole ground of human interests, to which only the title of philosophy by right belongs" (Fichte, pp. 214–15).

To Fichte, as we have said, undoubtedly attaches the credit of the first attempt to construct, on the basis of criticism, a philosophy proper—in fact to reduce criticism to coherence and system. Neither his idealistic terminology and mode of exposition, nor the mystical and extravagant tendencies of the later developments of his system should blind us to this fact or to the general soundness of his starting-point. Schelling's subject-object or Absolute is, at bottom, and apart from mystical terminology, nothing but the same principle otherwise stated, the stress being laid on the indifference between subject and object of the *prius* of reality—of that which constitutes the *possibility of consciousness.* The method and terminology originated by Fichte, and carried out in a modified form by Schelling, reached its culmination in Hegel, who may be said to have anticipated in metaphysical guise the doctrine of evolution. The dialectical method which, though discovered by Fichte, was perfected as regards expression by Hegel is contained in principle in the table of the categories. The *noumenal* fact constituting the essence of conscious experience consists with Hegel in the *process* of the categories themselves. "The *idee* is essentially *process*, because its identity is only the absoluteness and freedom of the conception, in so far as it is

absolute negativity and therefore dialectic" (*Encyclopædie der Philosophischen Wissenschaften*, p. 186). Hegel, in seizing the *formal* element at the root of experience, lets fall the *material*, and hence some have failed to distinguish his philosophy from an Absolute Illusionism.

The systems of which Hegel's is the culmination are founded essentially on the *transcendental analytic* and *dialectic*. Side by side with the dialectical, two other schools have coexisted in Germany equally claiming the parentage of Kant, but founding more especially upon the *transcendental æsthetic*. Rejecting the dialectical method, they endeavour to obtain speculative results by induction. Their most prominent representatives are Schopenhauer, Hartmann and Bahnsen on the one side, and Herbart, Beneke and Lotze on the other.

Schopenhauer, in identifying the metaphysical principle at the basis of the Conscious, with Will, holds fast the Kantian antithesis of *noumenon* and *phenomenon*. The pure self-existence posited in every conscious act is opposed to its realisation as phenomenon of consciousness, but this opposition cannot be said to involve dualism as the Hegelians contend. The world as *will* and the world as *presentation*, in other words, the world as thing-in-itself, and the world as appearance are only diverse aspects of the same fundamental fact. The identification of the thing-in-itself with the function termed Will may be open to criticism, but Schopenhauer's Monism can hardly be called in question. An attempt to obliterate the distinction between the content of consciousness and the principle it presupposes can only be completely successful at the cost of the whole critical position, and by a relapse into the crude Materialism or Idealism of the last century, which would make either "matter" or "mind" itself absolute.

The most distinguished modern representative of the

Pessimist doctrine, Eduard von Hartmann, defines the fact at the foundation of the reality given in consciousness as "the Unconscious." This negative designation he employs to discountenance the vulgar anthropomorphic confusion by which consciousness is attributed to the Absolute it implies (*Philosophie des Unbewussten*, 3rd ed. p. 543). Consciousness is a contradiction in any other than a phenomenal sense. A peculiarity of Hartmann's metaphysics is his rehabilitation of the Kantian things-in-themselves, which he conceives not to be inconsistent with a monistic postulate. In opposition to Schopenhauer he maintains *will* to be impossible apart from *presentation*, hence a noumenal *will* implies a noumenal *presentation* as its correlate. Space, time and the individuation deducible from them are generated unconsciously, or extra-consciously, and in this way a world of things-in-themselves arises, which becomes transformed in consciousness into the world of phenomena with its determinate forms. Only thus, according to Hartmann, can individuation of consciousness be explained. The objective thing-in-itself is thus, on Hartmann's principles, not an ultimate but a derivative fact. The objective *thing* exists *in itself* in so far as it is independent of consciousness, but not absolutely.

Herbart (1776–1840), the founder of the second line of thought mentioned, represents a partial reaction to a dogmatic standpoint. Being is assumed as coincident with appearance, in so far that every quality in the phenomenon indicates a corresponding thing-in-itself. This, as will be seen, is simply the re-introduction of the Kantian cosmological *noumena* and *à fortiori* of the Leibnitzian monadology in a slightly altered form. Not only every thing but every quality of the sense-world has a noumenal correlate according to Herbart. The monistic indications in Kant are lost in a maze of Leibnitzian pluralism based upon mathematical formulæ. Herbart's

philosophy is not unjustly defined by Dühring (*Geschichte der Philosophie*, p. 455), as based on the principle of "making a mistake in order to excuse it by another mistake." Most of Herbart's followers (e.g. Beneke) have confined themselves to psychology, and it is noteworthy that, whereas in the case of Hermann Lotze a wider range is attempted, the pluralist basis has been abandoned as untenable.

The extent to which the modern scientific materialist school is indebted to Kant may be seen from Lange's great work. Professor Wundt remarks ('Mind,' vol. ii. p. 502) of its doctrines: "In them a strictly mechanical and atomistic theory of the universe is connected with the idea that the atoms possess internal states, and that these internal states in combination constitute what we call physical phenomena. Such a theory is evidently not materialism, but may be more fitly designated "Monism," as by Haeckel, to distinguish it from the Dualism in vogue." This is of course closely analogous to the mind-stuff theory of Clifford, and the same criticism will apply to it, namely, that it leaves the fundamental difficulty untouched, while professing to solve it. It assumes a phenomenal world as given, without attempting to deduce it from any principle, such as "theory of knowledge" demands. The designation "Monism" is therefore hardly applicable.

The tendency of all systematic thought in the present day is nevertheless toward a Monism, and this explains the favour beginning to be shown by scientists for Spinoza. Most *savants* of any eminence instinctively recognise the impossibility of a mere mechanical aggregate of phenomena being the "last word" of systematised human knowledge. Scientific Monism, as is perhaps only natural, seeks to attain satisfaction by mere phrases such as "unknowable," "one reality," &c. (frequently so expressed as to imply a dualism), rather than by a diligent

investigation into the conditions of knowledge itself, the method inaugurated by Kant, and the only one which can lead to a permanently satisfactory synthesis. That which is posited in the very fact of consciousness, but which can only find a place in discursive thought as the notion of an existence realising itself in the world-process—this fact, the fundamental postulate of all conscious experience, and therefore of all reality—can alone be the starting-point for any synthetic system. The notion of plurality—a mechanical aggregate in space and time—will not explain the relation of myself to other phenomena like myself, still less to the world-evolution as a whole. The erection of the individual consciousness (the empirical ego) or of ideas or presentations into things-in-themselves will further this quite as little as the erection of material qualities into things-in-themselves, standpoints we see appearing in protean guises in the present day both in this country and on the continent.

It is generally recognised that no existing system can lay any claim to finality. There can hardly be said now to be a philosophical school in the old sense of the word, namely, a body of thinkers slavishly adhering to every detail of a master, if we except the Comtists. The tendency of the modern mind is rather (so to speak) to revel in disintegration. It is the mode, to exaggerate differences, to repudiate all connection, save, perhaps, that of suggestion, with older systems, even when, notwithstanding the parade of originality, the assumed new departure leads us back to old positions essentially unchanged, but for being presented in a modern guise and with a precision of language more in accordance with the present state of philosophic terminology. This is to be regretted, as the bane of philosophy in the past, even in its most eminent representatives, has lain in overstraining after originality. The divergency with

which metaphysicians are commonly taunted lies more in terminology than is often thought. This fact is strikingly illustrated by the case of Fichte and Schopenhauer. The leading principles and much of the development of Schopenhauer's system is contained in Fichte's *Wissenschaftslehre*, yet this did not prevent Schopenhauer from stigmatising the last-named work as a farrago of absurdities. Had Schopenhauer been less solicitous to maintain his character as an "original thinker," he would possibly have admitted his debt to the elder philosopher.

The tendency of the various eddies and streamlets of current philosophic thought, to converge into two main channels is unmistakable. These main channels are the philosophy of modern scientific realism, with its leading doctrines of the Persistence of Force and of Evolution, based on induction from the data of completed experience; and the philosophy of transcendental Monism, based on an analysis of those processes of consciousness in general, which make experience possible. The seeming hostility of these two lines of thought is owing to the fact that one is based on experience made, the other on experience in the making.* The immediate task of philosophy is their reconciliation in a synthesis.

"Our knowledge," says the scientist, "is strictly confined to what is contained in the teaching of experience." "With all my heart," replies the transcendentalist (with reminiscences of Carlyle), "only, what *is* contained in the teaching of experience?" In philosophy we have to reconstruct the world in reproductive consciousness, i.e. in abstract thought; the only way we can do this effectually

* Even empirical psychology, which traces the unfolding of experience in the individual, presupposes experience *in general* as already given. Psychology is the anatomisation—the mechanical dissection—of experience; "Theory of Knowledge," or Transcendental Philosophy, its chemical analysis.

is by educing it from the most elementary datum of that *pro*ductive experience, in and for which the world alone exists. To the oft-repeated sneers as to Metaphysics being a thing of the past, and having to give way before positive science, the object-matter of which alone deals with realities, the reply is easy so far as concerns Metaphysics in the modern sense of the word, the only sense in which a thinker of the present day would care to defend it. Metaphysics deals as much with reality as any abstract science. But the propositions of every abstract science represent a *transfigured* reality, and this the more so, the more abstract it is; in other words, the more its subject-matter is removed from the given concrete reality of sensuous intuition. The atom, the ultimate postulate of physical science, is in itself a striking instance of this. The same may be said of the postulates of the higher mathematics, &c. It is surely, then, only to be expected that the most abstract of all sciences, that which has for its subject-matter, not merely the laws of a particular department or aspect of the content of experience, but the conditions of experience itself, should, by reason of its abstractness, be unintelligible to the superficial student. Metaphysics, in so far as we understand by this term "Theory of Knowledge," is as little in danger of becoming obsolete as Mathematics. The future may reject in whole or in part Kant's solution, but mankind will never be able permanently to ignore the problem Kant formulated. Philosophy, since Kant, it has been well said, is the re-reading of experience rather than, as previously, the transcending of experience.

The renewed study of Kant must certainly be regarded as a hopeful sign of the times. Philosophy, there is reason to believe, is ceasing to be a thing of class-rooms and examinations merely, and becoming a common interest

among all thinking men. At the same time that dissatisfaction is felt with existing systems the need of a synthesis—the intrinsic worthlessness of any serious study that does not have synthesis for an end—is more and more generally recognised. This being the state of things, a conviction of the importance of a thorough study of Kant, the fountainhead of modern systematic thought, is a natural consequence.

It would be impossible to give anything like a sketch, however general, of the flood of neo-Kantian literature, which for some years past has been pouring from the press. Germany is, of course, first in the Kantian revival, but it has extended, in a relatively equal degree, to Britain, the United States and even France. Indeed, everywhere where philosophy is being studied it is felt that the results of post-Kantian thought need thorough revision, if not complete reconstruction, and hence attention is being turned on all sides to a further elucidation of the great Königsberg thinker's work itself.

We can devote but little space to an indication of the obligations, immense though they be, which science and general culture are under to Kant. The first germ of the modern scientific doctrine of Evolution, the nebular theory of the origin of the planetary systems, was enunciated and developed by Kant in his *Theorie des Himmels*, published in 1755, forty years previous to the publication by Laplace, in 1796, of his celebrated *Système du Monde*. The hypothesis of the sun being surrounded by an atmosphere of luminous gas, and if not itself of gaseous nature, at least a molten body, undergoing a slow process of solidification, was verified by independent research, a few years after being put forward by Kant. "There will come a time," wrote Kant, "when it" (the sun) "will be burnt out, and its place, at present the centre of light and life, will be occupied by an eternal darkness." The fixed stars

Kant regarded (equally in accord with the views of modern astronomers) as the centres of solar systems like our own. His observations on earthquakes and volcanoes represent no less, in the main, present views on the subject. It is noteworthy that one important idea, thrown out by Kant as a speculation, namely, that of the gradual diminution of the earth's motion on its axis, owing to the friction produced by the contrary action of the tides, was first theoretically verified by Mayer in his work *Beiträge zur Mechanik des Himmels*, in the year 1848. It was not before 1865, a hundred years after its hypothetical enunciation by Kant, that the fact of such a diminution having actually taken place was astronomically established by Hansen of Gotha. The same eminent astronomer had previously substantiated another astronomical suggestion of Kant's, i.e. that the moon's centre of gravity did not coincide with its actual centre, but lay on the side furthest removed from the earth. It may not be generally known that Kant predicted on theoretical grounds the existence of the planet Uranus, many years before its discovery by Herschel. Dove's law of the motion of the winds was also anticipated by Kant in his 'Observations on the Theory of the Winds,' published in 1756. But by far the most significant fact in connection with Kant as a scientific thinker is his forestallment of Darwinism, and indeed of the doctrine of Evolution in its broadest form, as the following passages will show: "The union of so many species of animals," says Kant, "in a certain common schema . . . seeming to form their basis, where remarkable simplicity of outline seems capable—by the shortening of one and the lengthening of another, the compression of this and the development of that part—of bringing forth so great a variety of species, allows us, at least, a faint ray of hope that something may be explained here on that principle of the mechanism of Nature, without

which there could be no such thing as natural science at all. This analogy of forms, which, in spite of all their diversity, seem to be generated from a common origin, strengthens the supposition of a real relationship between them, in their production from an original parent form, by the progressive approach of one species to another, from that in which the principle of purpose seems most exhibited, namely, *from the man, to the polyp, and from this again to the moss and lichen, and finally to the lowest phase of nature known to us—to inorganic matter—from which, together with its forces, the whole technique of nature seems derivable according to mechanical laws—that technique of nature, to us so incomprehensible in organised beings, that we believe ourselves obliged to assume a distinct principle for its explanation*"* (*Kritik der Urtheilskraft*. ed. Kirchmann, p. 299). And again, "He (the naturalist) may allow the earth—itself arisen from chaotic conditions—to have given birth originally to beings of a less perfect form, these again to others, which have developed themselves in a manner more adapted to their habitat, and their mutual relations [natural selection?], till this mother-earth—herself becoming rigid—has limited her births to definite species, incapable of further modifications; and thus their variety has remained as it was at the end of the operation of her formative productivity." Further on, Kant speaks of the possibility of "certain water-animals developing by degrees into marsh-animals, and these, again, after some generations, into land-animals." History can point to few more distinct premonitions of a great truth than is contained in the foregoing and many other passages of similar import. It must be remembered that while these views were laid before the world in 1780, Erasmus Darwin's 'Zoonomia, or the laws of organic life,' did not appear till, at the earliest, 1794, so that Kant's utterances actually preceded

* The italics are my own.

those of the father of so-called Darwinism, the grandfather of Charles Darwin himself.

Although, as we observed on a previous page, Kant cannot be said to have founded a science of society, and although his views on some subjects, embraced within this wide field (especially on their practical side), are to modern notions crude, we must not forget the brilliant glimpses occasionally to be met with in his works, of vistas, which to Kant were obscure and hazy, but which the subsequent evolution of thought and social life has placed in a comparatively clear light. The most remarkable of these glimpses is contained in the short essay entitled "An Idea of Universal History from the point of view of Humanity," an essay which explicitly recognises the phenomena of human society as under the dominion of law, and hence as capable of scientific treatment, anticipating in many points the "historical method" of modern thought, and even the actual conceptions of a Comte, a Buckle, or a Spencer. Kant, indeed, went so far as to prophesy the advent of thinkers who would elaborate and develop to an incalculable extent the hints thrown out in his now slight sketch. It would perhaps be hardly too great praise to describe this little *brochure* as the most valuable of all Kant's minor works, when viewed in its relation to later thought.

We have only detailed a few of the more important achievements of Kant in natural science; his works teem with fruitful suggestions and hints to the interrogator of nature. But Kant's scientific achievements were, during his lifetime, as they have been since his death, eclipsed by his philosophic fame. Had he confined himself to physical research, it is likely enough the world would have recognised in him the rival of Newton. As it is, Kant the philosopher, not Kant the scientist, has come down to us.

Kant's influence on the general culture and thought of the nineteenth century, apart from the "faculties" of

philosophy and science in a special sense, is so immense and wide-reaching, that to follow its course through all its ramifications, direct and indirect, would be an undertaking amounting to little less than writing a history of nineteenth-century thought itself. As we have seen, nearly all the great speculative problems of the present age were formulated by Kant. There is scarcely a subject of human interest upon which he has not thrown some light, if not by actual suggestion, by the impulse of the mighty wave of thought he inaugurated. Perhaps the most prominent feature of this wave of thought is the conception of the universality of law which characterises it. Before Kant's time the great principle referred to was apprehended in its full bearing by none but a few isolated *savants* and philosophers; since his time it has become the common heritage of the thoughtful and cultured among all nations. We do not mean to imply that the conception itself, much less the great change of mental attitude involved therein, is entirely the work of Kant. All we claim is that the Königsberg colossus may fairly be taken as the representative personality of that intellectual movement which is based on a recognition of the universal reign of law.

The tremendous hold the critical spirit took upon the minds of Kant's countrymen in every direction, even in matters most immediately under the *ægis* of obscurantism and authority, is illustrated by the rise and rapid spread of the schools of scientific Biblical criticism, some of which, indeed, like that of Paulus, were soon superseded, but only to give way to others, which have achieved results now the common property of modern scholarship. Regard it in what light we may, the fact is incontestable that Kant indirectly dealt a deadly blow at supernatural religion in Germany among all classes—a blow from the effects of which it has never since recovered.

Kant's relation to traditional authority generally is aptly expressed by Schopenhauer (*Welt als Wille und Vorstellung*, pp. 475-6). "Descartes was a remarkable intellect, and when one considers the age in which he lived, he achieved much. But if we leave this consideration aside and measure him by his boasted emancipation of thought from all its chains and his would-be inauguration of a new period of independent research, we shall find—with all his scepticism, which was destitute of any real earnestness, and therefore quickly and readily yielding—that he indeed *made* as though he were about to strike off all the chains of indoctrinated opinion that bound his age and nation; but that this is merely a pretence, assumed for the purpose of immediately taking them up again and riveting them so much the faster—And thus it is with all his successors till Kant.* Goethe's verse is especially applicable to an independent thinker of this stamp:

> 'With all due deference he appears to me,
> Much like your long-legged grasshopper to be,
> Which flits about, and flying bounds along,
> Then in the grass sings his familiar song.'

Kant had reason to make as though he too meant no more. But the bound contemplated—which was permitted because it was known only to lead back again into the grass—developed this time into a flight, and now those who stood below could only look after him, unable as they were to seize him."

We may conclude this chapter, and our introduction, by observing that, whatever may be the advances made in philosophy since Kant's death, and whatever the obvious and even grave defects in Kant's work, the 'Critique of Pure Reason' must assuredly continue to furnish the

* Schopenhauer ought to have excepted Spinoza from this accusation.

platform for the discussion of all the more comprehensive problems of philosophy for some time to come. Hegel boasted of having superseded Kant, with how much of truth we now see. The study of Kant is being resumed on all sides, while Hegel, when studied at all (as he undoubtedly deserves to be), is studied by the side of Kant and in the light of Kant. Adapting the words used by an eminent modern historian in reference to Gibbon and the study of history to Kant and the study of philosophy, we may say, "Whatever else is read" Kant "must be read too."

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PROLEGOMENA

TO EVERY FUTURE SYSTEM OF METAPHYSICS WHICH CAN CLAIM TO RANK AS SCIENCE.

INTRODUCTION.

THESE Prolegomena are not designed for the use of pupils, but of future teachers, and even for the latter should serve not so much to regulate the exposition of an already existing science, as for the discovery of such a science.

There are scholars with whom the history of philosophy (ancient no less than modern) constitutes their own philosophy; for these the present Prolegomena are not written. They must wait till those, who are endeavouring to construct one out of the resources of Reason, have completed their work, and it will then be their turn to give an account of what has already taken place. Otherwise nothing can be said which, in their opinion, has not been said before, and in fact this may pass as an infallible prophecy for all future time; inasmuch as the human understanding having speculated on countless subjects through so many centuries, in so many ways, it can scarcely fail that for every new idea an old one should be found having some affinity with it.

My purpose is, to convince all those who care to trouble themselves with metaphysics, that it is indispensably necessary for the present to suspend their work, to look upon all that is gone before as non-existent, and, above all things, first to propose the question "Whether such a thing as metaphysics be even possible at all?"

If it be a science, how comes it that it cannot like other sciences win for itself a universal and lasting recognition? If it be not one, how is it that under the semblance of a science it is ceaselessly boasting and holding out to the human understanding hopes that are never extinguished and never fulfilled? Something must be definitely decided respecting the nature of this assumed science,

whether it be to demonstrate our knowledge or our ignorance; for it is impossible that it should remain longer on the same footing as heretofore. It seems well-nigh ridiculous, while every other science ceaselessly progresses, that this which is supposed to be wisdom itself, whose oracle every one interrogates, is continually turning round on the same spot, without moving a step in advance. Its votaries have also much decreased, and we do not see those who feel themselves strong enough to shine in other sciences, willing to risk their fame in this, where every one, ignorant though he be in all else, ventures upon a decided opinion, because forsooth in this sphere there is no certain weight and measure at hand by which to distinguish profundity from worthless jargon.

It is, however, nothing unheard of, after lengthened treatment of a science, when wonders are thought as to the progress made in it, that some one lets fall the question: Whether and how such a science is possible at all? For the human Reason is so fond of building, that it has many times reared up a lofty tower and afterwards pulled it down again, to see how its foundation was laid. It is never too late to become reasonable and wise; but it is always more difficult when the knowledge comes late to bring it into working order.

To ask, whether a science is possible, presupposes a doubt as to its reality. But such a doubt must offend all those whose whole fortune, perhaps, consists in this supposed treasure; any one who starts such a doubt may always make up his mind then for resistance on all sides. Some, in the proud consciousness of their old and therefore, as they think, legitimate possession, with their metaphysical compendiums in their hands, will look down upon it with contempt. Others, who never see anything anywhere that does not coincide with what they have elsewhere previously seen, will not understand it, and everything will remain for some time as though nothing at all had happened to prepare or to admit the hope of a near change.

At the same time, I may confidently predict that the self-thinking reader of these Prolegomena will not merely doubt his previous science, but in the end will be quite

convinced, that there cannot exist such a science without the demands here made being satisfied, upon which its possibility rests, and that inasmuch as this has never happened, that there is as yet no such thing as metaphysics at all. But as notwithstanding the search after it can never lose its interest,[1] because the interests of the universal human Reason are so intimately bound up with it, he will confess that a complete reform, or rather a new birth according to a plan hitherto quite unknown, is inevitable, however much it may be striven against for a time.

Since the attempts of Locke and Leibnitz, or rather since the first rise of metaphysics as far as its history will reach, no event has occurred that in view of the fortunes of the science could be more decisive than the attack made upon it by David Hume. He, indeed, threw no light upon this order of knowledge, but he struck a spark by which a light might have been kindled, had it touched a receptive substance, to have preserved and enlarged its glimmer.

Hume took for his starting-point, mainly, a single but important conception of metaphysics, namely, that of the *connection of Cause and Effect* (together with the derivative conceptions of Force and Action, &c.) and required of the Reason which professes to have given it birth a rigid justification of its right, to think, that something is so constructed that on its being posited something else is therewith necessarily also posited; for so much is contained in the conception of Cause. He proved irrefutably that it is quite impossible for the Reason *à priori*, out of mere conceptions, to cogitate this connection, since it involves necessity; but the problem nevertheless was not to be overlooked, how that, because something exists, something else must necessarily also exist, and thus how the conception of such a connection can be regarded as *à priori*. Hence he concluded that the Reason completely deceived itself with this conception, that it falsely claimed it as its own child, while it was nothing more than a bastard of the imagination, which, impregnated by experience, had

[1] "Rusticus expectat, dum defluat amnis, at ille Labitur et labetur in omne volubilis ævum." (Horat.) "The peasant waits till the river has flowed past, but it flows, and will continue to flow, to all eternity."

brought certain presentations under the law of association, and had substituted a subjective necessity arising thence, i.e., from habit, for an objective one founded on insight. From this he concluded that the Reason possessed no faculty of cogitating such connections even in general, because its conceptions would then be mere inventions, and all its pretended *à priori* cognitions nothing but common experiences mislabelled; which is as much as to say, no such thing as metaphysics exists at all, and there is no possibility of its ever existing.[1]

However hasty and incorrect his conclusion may have been, it was at least based on investigation, and it would have been well worth while if the good heads of his time had united to solve the problem in the sense in which he had stated it, if as far as possible with happier results; the consequence of which must have been a speedy and complete reform of the science.

But the always unfavourable fate of metaphysics, willed that he should be understood by no one. It cannot be without feeling a certain regret that one sees how completely his opponents, Reid, Oswald, Beattie, and, lastly, Priestley, missed the point of his problem in taking that for granted which was precisely what he doubted, and on the other hand in proving with warmth, and in most cases great immodesty, what it had never entered his head to question, and as a result in so completely mistaking his reforming hint that everything remained in the same state as though nothing had happened. It was not the question whether the conception of Cause was correct and useful, and in view of the whole knowledge of Nature, indispensable, for upon this Hume had never cast a doubt,

[1] At the same time, Hume called this destructive philosophy itself metaphysics, and attached a high value to it. "Metaphysics and morals," he says (Essays, Part IV.), "are the most important branches of science; mathematics and natural philosophy have not half the same value." But the acute man considered here only the negative uses, that the moderation of the exaggerated claims of the speculative reason would have, in putting an end to the many endless and vexatious disputes that perplex mankind; but at the same time he lost sight of the positive evils that would ensue from the removal of the most important expectations of the Reason, which it can alone place before the will as the highest goal of all its strivings.

but whether it could be cogitated *à priori* by the Reason in such a manner as to constitute an inward truth independent of all experience, and therefore of a more extended use than that of being solely applied to the objects of experience; it was upon this that Hume desired enlightenment. The question was as to the origin of the idea, not as to its practical necessity in use; were the former ascertained, the conditions of its use and the extent in which it is valid would have been sufficiently obvious.

The opponents of this celebrated man, to have done the problem full justice, must have penetrated deeply into the nature of the Reason, in so far as it is occupied solely with pure thought, a thing which was inconvenient for them. They invented therefore a more convenient means, by which, without any insight, they might defy him, namely, the appeal to the *common sense* of mankind. It is indeed a great natural gift to possess straightforward (or, as it has been recently called, plain) common sense. But it must be proved by deeds, by the thoughtfulness and rationality of what one thinks and says, and not by appealing to it as an oracle, when one has nothing wise to adduce in one's justification. When insight and science are at a low ebb, then and not before to appeal to common sense is one of the subtle inventions of modern times, by which the emptiest talker may coolly confront the profoundest thinker and hold out against him. But so long as there is a small remnant of insight left, one will be cautious of clutching at this straw. And seen in its true light, the argument is nothing better than an appeal to the verdict of the multitude; a clamour before which the philosopher blushes, and the popular witling scornfully triumphs. But I should think that Hume can make as good claim to the possession of common sense as Beattie, and in addition, to something the latter certainly did not possess, namely, a critical Reason, to hold common sense within bounds in order not to let it overreach itself in speculations; or if we are merely concerned with the latter, not to require it to decide, seeing that it is incompetent to deal with matters outside its own axioms; for only in this way will it remain a healthy common sense. Chisel and hammer are quite sufficient to shape a piece of

deal, but for copper-engraving an etching-needle is necessary. In the same way, common, no less than speculative understanding, is useful in its kind; the former when we have to do with judgments having an immediate bearing on experience, but the latter, where we have to judge, universally, out of mere conceptions, as for instance in metaphysics, where the self-styling (though often *per antiphrasin*) healthy understanding is capable of no judgment at all.

I readily confess, the reminder of David Hume was what many years ago first broke my dogmatic slumber, and gave my researches in the field of speculative philosophy quite a different direction. I was far enough removed from giving him an ear so far as his consequences were concerned, the latter resulting merely from his not having placed his problem fully before him, but only attacking a part of it, which, without taking the whole into consideration, could not possibly afford a solution. When one starts from a well-founded, though undeveloped, idea that a predecessor has left, one may well hope, by increased reflection, to bring it further than was possible for the acute man one has to thank for the original sparks of its light.

First of all, I tried whether Hume's observation could not be made general, and soon found that the conception of the connection of cause and effect was not by a long way the only one by which the understanding cogitates *à priori* the connections of things, but that metaphysics consists entirely of such. I endeavoured to ascertain their number, and as I succeeded in doing this to my satisfaction, namely, out of a single principle, I proceeded to the deduction of these conceptions, which I was now assured could not, as Hume had pretended, be derived from experience but must have originated in the pure understanding. This deduction, that seemed impossible to my acute predecessor, that had not even occurred to any one except him, although every one uncoercedly used the conception (without asking on what its objective validity rested); this, I say, was the most difficult problem that could ever be undertaken in the interests of metaphysics, and the worst of it was, that metaphysics,

so far as it anywhere exists at present, could not afford me the least help, because the above deduction had in the first place to make metaphysics possible. Having now succeeded in the solution of Hume's problem, not in one particular case only, but in respect of the whole capacity of the pure Reason, I could at least more surely, though still only by slow steps, determine the whole range of the pure Reason, in its limits as well as in its content, completely according to universal principles, which was what metaphysics required, in order to construct its system on an assured plan.

I am afraid, however, lest the carrying out of the problem of Hume in its greatest possible development (namely, in the Critique of the Pure Reason) should fare as the problem itself fared when it was first stated. It will be falsely judged, because it is misunderstood; it will be misunderstood, because people, though they may care to turn over the leaves of the book, will not care to think it out; and they will be unwilling to expend this trouble upon it because the work is dry, obscure, and opposed to all accustomed conceptions, besides being diffuse. But I must confess, it was quite unexpected for me to hear from a philosopher complaints as to its want of popularity, entertainingness, and agreeable arrangement, when the question was of a branch of knowledge highly prized and indispensable to humanity, and which cannot be treated otherwise than according to the most strict rules of scholastic precision; whereby popularity may indeed follow in time, but can never be expected at the commencement. As regards a certain obscurity, however, arising partly from the diffuseness of the plan, in consequence of which the main points of the investigation are not so readily grasped, the grievance must be admitted, and this it is the task of the present Prolegomena to remove.

The above work, which presents the capacity of the pure Reason in its whole range and boundaries, always remains the foundation to which the Prolegomena are only preparatory; for the Critique must, as science, stand complete and systematic even down to the smallest detail, before we can so much as think of the rise of metaphysics,

or even allow ourselves the most distant hope in this direction.

We have been long accustomed to see old and worn-out branches of knowledge receive a new support, by being taken out of their former coverings, and suited with a systematic garment according to our own approved style, but under new titles; and the great majority of readers will expect nothing different from our Critique. But these Prolegomena will convince him that it is quite a new science, of which no one previously had had the smallest conception, of which even the idea was unknown, and with reference to which all hitherto received knowledge was unavailable, with the exception of the hint afforded by Hume's doubt. But Hume never dreamt of a possible formal science of this nature, and in order to land his ship in safety, ran it aground on the shore of scepticism, where it might lie and rot; instead of which, it is my purpose to furnish a pilot, who, according to certain principles of seamanship, derived from a knowledge of the globe, and supplied with a complete map and compass, may steer the ship with safety wherever it seems good to him.

In a new science, which is wholly isolated and single of its kind, we should achieve nothing were we to start with the prejudice that we could judge of things by means of our previously acquired knowledge, which is precisely what has first to be called in question. For were we to do this, we should only fancy we saw everywhere what we had already known, the expressions, having a similar sound, only that all would appear utterly metamorphosed, senseless and unintelligible, because we should have as a foundation our own notions, made by long habit a second nature, instead of the author's. But the diffuseness of the work, founded as it is on science (of which an unavoidable dryness and scholastic precision are characteristics) rather than on style, however advantageous it may be to the subject, is undoubtedly disadvantageous to the book.

It is indeed not given to every one to write as subtly and at the same time as fascinatingly as David Hume, or as profoundly and as elegantly as Moses Mendelssohn;

but I flatter myself I might have rendered my style popular, if I had only had to sketch a plan. and to leave its completion to others, and not had the well-being of the science, with which I had been so long occupied, so much at heart; for it requires considerable endurance and not a little self-denial to choose a late but enduring fame, in preference to the allurement of a speedy and favourable reception.

Plan-making is often a luxurious and pretentious mental occupation, whereby the reputation of a creative genius is acquired by demanding what one cannot achieve oneself, censuring what one cannot improve, and proposing what one does not know where to find. But to a thorough plan of the general Critique of the Reason something more is necessary, as may be well supposed, if it is not to be, as usual, a mere declamation of pious wishes. For pure Reason is so isolated, and in itself so intimately connected a sphere, that no part of it can be touched upon without affecting the rest. We can accomplish nothing, therefore, without determining the position and influence of each part with regard to the others, because there is nothing external to it by which our judgment can be corrected as to its inner character. The validity and use of every part depends upon the relations in which it stands toward the rest within the Reason, and as in the construction of an organised body, the purpose of each member can only be deduced from a complete conception of the whole. It may therefore be said of such a critique that it is never reliable, unless it be quite complete, down to the least of the elements of pure Reason; and that in the sphere of this faculty, one must determine and expound either *everything* or *nothing*.

Yet although a mere plan, if it preceded the critique, would be incomprehensible, unreliable and useless, it is so much the more useful when it follows it. For one is then in a position to view the whole, to test the main points upon which the science rests piecemeal, and to render the style better than was possible on the first execution of the work.

The following is such a plan, which as the work is complete may be presented in an analytical manner,

whereas the work itself was obliged to be constructed throughout on a synthetic method, in order that the science might exhibit all its articulations in their natural connection as the organisation of a special faculty of knowledge. Should, on the other hand, any one find this plan, put forward by me as a Prolegomena to any future system of metaphysics, itself obscure, he must bear in mind that it is not necessary for every one to study metaphysics; that there is much talent, perfectly adequate to the investigation of thorough and even deep sciences, lying more in the region of intuition, which is unsuccessful in a species of research based solely on abstract conceptions, and that, in such a case, mental abilities should be turned in another direction. But he who undertakes to judge a system of metaphysics or to construct one, must in every way satisfy the demands that will here be made. It may so happen, either that he accepts my solution, or that he utterly refutes it and offers another in its stead—evade it, he cannot; and that, finally, the so-much decried obscurity (though a frequent covering for indolence and stupidity) may have its uses, since those who in respect of other sciences maintain a judicious silence, in questions of metaphysics speak and decide in a dictatorial tone, because here their ignorance does not distinctly clash with the knowledge of other people, though not the less with the axioms of a sound criticism; of which one may say, *ignavum fucos, pecus a præsepibus arcent.* Virg.: (they keep off, from the hives, the lazy swarm of drones).

PROLEGOMENA.

INTRODUCTORY REMARKS ON THE SPECIALITY OF ALL METAPHYSICAL KNOWLEDGE.

§ 1.

Of the Source of Metaphysics.

In presenting a branch of knowledge as *science*, it is necessary to be able to define with precision its distinguishing characteristic, that which it possesses in common with no other branch, and which is therefore *special* to itself; when this is not the case the boundaries of all sciences run into one another, and no one of them can be thoroughly treated of, according to its own nature.

Now this speciality may consist in the distinction of its *object*, of its *sources of cognition*, of its *mode of cognition*, or lastly, of several if not all these points taken together, on which the idea of a possible science and of its territory primarily rests.

Firstly, as regards the *sources* of metaphysical knowledge, the very conception of the latter shows that these cannot be empirical. Its principles (under which not merely its axioms, but also its fundamental conceptions are included) must consequently never be derived from experience; since it is not *physical* but *metaphysical* knowledge, i.e., knowledge beyond experience, that is wanted. Thus neither external experience, the source of physical science proper, nor internal experience, the groundwork of empirical psychology, will suffice for its foundation. It consists, then, in knowledge *à priori*, that is, knowledge derived from pure understanding and pure reason.

But in this, there is nothing to distinguish it from pure mathematics; it must be defined, therefore, as *pure philosophical knowledge;* respecting the meaning of which expression, I must refer the reader to the *Critique of Pure Reason*, (Bohn's Ed. p. 435,) where the distinction between these two modes of the Reason's use are clearly and exhaustively expounded. So much as to the sources of metaphysical knowledge.

§ 2.

OF THE MODE OF COGNITION[1] THAT CAN ALONE BE TERMED METAPHYSICAL.

a. *Of the distinction between synthetic and analytic judgments generally.*

Metaphysical knowledge must contain simply judgments *à priori*, so much is demanded by the speciality of its sources. But judgments, let them have what origin they may, or let them even as regards logical form be constituted as they may, possess a distinction according to their content, by virtue of which they are either simply *explanatory* and contribute nothing to the content of a cognition, or they are *extensive*, and enlarge the given cognition; the first may be termed *analytic*, and the second *synthetic* judgments.

Analytic judgments say nothing in the predicate, but what was already cogitated in the conception of the subject, though perhaps not so clearly, or with the same degree of consciousness. When I say, all bodies are extended, I do not thereby enlarge my conception of a body in the least, but simply analyse it, inasmuch as extension, although not expressly stated, was already cogitated in that conception; the judgment is, in other words, analytic. On the other hand, the proposition, some bodies are heavy, contains something in the predicate which was not already cogitated in the general conception

[1] Kant's expression "erkenntniss" I have variously translated "knowledge" and "cognition," according to circumstances and the usages of the English language.—Tr.—

of a body; it enlarges, that is to say, my knowledge, in so far as it adds something to my conception; and must therefore be termed a synthetic judgment.

b. *The common principle of all analytic judgments is the principle of contradiction.*

All analytic judgments are based entirely on the principle of contradiction, and are by their nature cognitions *à priori*, whether the conceptions serving as their matter be empirical or not. For inasmuch as the predicate of an affirmative analytic judgment is previously cogitated in the conception of the subject, it cannot without contradiction be denied of it: in the same way, its contrary, in a negative analytic judgment, must necessarily be denied of the subject, likewise in accordance with the principle of contradiction. It is thus with the propositions—every body is extended; no body is unextended (simple). For this reason all analytic propositions are judgments *à priori*, although their conceptions may be empirical. Let us take as an instance the proposition, gold is a yellow metal. Now, to know this, I require no further experience beyond my conception of gold, which contains the propositions that this body is yellow and a metal: for this constitutes precisely my conception, and therefore I have only to dissect it, without needing to look around for anything elsewhere.

c. *Synthetic judgments demand a principle other than that of contradiction.*

There are synthetic judgments *à posteriori* whose origin is empirical; but there are also others of an *à priori* certainty, that spring from the Understanding and the Reason. But both are alike in this, that they can never have their source solely in the axiom of analysis, viz., the principle of contradiction; they require an altogether different principle, notwithstanding that whatever principle they may be deduced from, they must always *conform to the principle of contradiction*, for nothing can be opposed to this principle, although not everything can

be deduced from it. I will first of all bring synthetic judgments under certain classes.

(1) *Judgments of experience* are always synthetic. It would be absurd to found an analytic judgment on experience, as it is unnecessary to go beyond my own conception in order to construct the judgment, and therefore the confirmation of experience is unnecessary to it. That a body is extended is a proposition possessing *à priori* certainty, and no judgment of experience. For before I go to experience I have all the conditions of my judgment already present in the conception, out of which I simply draw the predicate in accordance with the principle of contradiction, and thereby at the same time the *necessity* of the judgment may be known, a point which experience could never teach me.

(2) *Mathematical judgments* are in their entirety synthetic. This truth seems hitherto to have altogether escaped the analysts of human Reason; indeed, to be directly opposed to all their suppositions, although it is indisputably certain and very important in its consequences. For, because it was found that the conclusions of mathematicians all proceed according to the principle of contradiction (which the nature of every apodictic certainty demands), it was concluded that the axioms were also known through the principle of contradiction, which was a great error; for though a synthetic proposition can be viewed in the light of the above principle, it can only be so by presupposing another synthetic proposition from which it is derived, but never by itself.

It must be first of all remarked that essentially mathematical propositions are always *à priori*, and never empirical, because they involve necessity, which cannot be inferred from experience. Should any one be unwilling to admit this, I will limit my assertion to *pure mathematics*, the very conception of which itself brings with it the fact that it contains nothing empirical, but simply pure knowledge *à priori*.

At first sight, one might be disposed to think the proposition $7+5=12$ merely analytic, resulting from the conception of a sum of seven and five, according to the principle of contradiction. But more closely considered it

will be found that the conception of the sum of 7 and 5 comprises nothing beyond the union of two numbers in a single one, and that therein nothing whatever is cogitated as to what this single number is, that comprehends both the others. The conception of twelve is by no means already cogitated, when I think merely of the union of seven and five, and I may dissect my conception of such a possible sum as long as I please, without discovering therein the number twelve. One must leave these conceptions, and call to one's aid an intuition corresponding to one or other of them, as for instance one's five fingers (or, like Segner in his Arithmetic, five points), and so gradually add the units of the five given in intuition to the conception of the seven. One's conception is therefore really enlarged by the proposition $7+5=12$; to the first a new one being added, that was in nowise cogitated in the former; in other words, arithmetical propositions are always synthetic, a truth which is more apparent when we take rather larger numbers, for we must then be clearly convinced, that turn and twist our conceptions as we may, without calling intuition to our aid, we shall never find the sum required, by the mere dissection of them.

Just as little is any axiom of pure geometry analytic. That a *straight* line is the shortest between two points, is a synthetic proposition. For my conception of *straight*, has no reference to size, but only to quality. The conception of the "shortest" therefore is quite additional, and cannot be drawn from any analysis of the conception of a straight line. Intuition must therefore again be taken to our aid, by means of which alone the synthesis is possible.

Certain other axioms, postulated by geometricians, are indeed really analytic and rest on the principle of contradiction, but they only serve, like identical propositions, as links in the chain of method, and not themselves as principles; as for instance $a=a$, the whole is equal to itself, or $(a-b)<a$, i.e., the whole is greater than its part. But even these, although they are contained in mere conceptions, are only admitted in mathematics because they can be presented in intuition. What produces the common belief that the predicate of such apodictic judgments lies already in our conception, and that the judg-

ment is therefore analytic, is merely the ambiguity of expression. We *ought*, namely, to cogitate a certain predicate to a given conception, and this necessity adheres even to the conceptions themselves. But the question is not what we *ought* to, but what we actually *do*, although obscurely, cogitate in them; this shows us that the predicate of those conceptions is dependent indeed necessarily, though not immediately (but by means of an added intuition), upon its subject.

§ 3.

OBSERVATION ON THE UNIVERSAL DIVISION OF JUDGMENTS INTO ANALYTIC AND SYNTHETIC.

This division is in view of the Critique of human understanding indispensable, and deserves therefore to be classic in this department; though I am not aware of any other in which it has any important use. And here I also find the cause why dogmatic philosophers who looked for the sources of metaphysical judgments in metaphysics itself (rather than outside of it, in the laws of the pure Reason in general), have always neglected this division, that seems so naturally to offer itself, and like the celebrated Wolff, or the acute Baumgarten, who followed in his steps, have sought the proof of the principle of sufficient reason, which is obviously synthetic, in that of contradiction. On the other hand, I can trace already in "Locke's Essays on the Human Understanding" a notion of this division. For in the third chapter of the fourth book, (Chap. III. § 9 *et seq.*,) after he has spoken of the connection of different presentations in judgments, and of their sources, one of which he places in identity or contradiction (analytic judgments), and the other in the existence of presentations in a subject (synthetic judgments), he confesses, § 10, that our knowledge (*à priori*) of the last is very limited, amounting almost to nothing. But there is so little that is definite and reduced to rule in what he says respecting this kind of knowledge, that one cannot wonder that nobody, strange to say, not excepting Hume, was induced thereby to institute investigations into the

class of propositions in question. For universal yet definite principles like these, are not easily learnt from other men, to whom they have been only dimly discernible. One must, first of all, have come upon them through one's own reflection, and one will then find them elsewhere, in places where otherwise they would certainly not have been discovered; since not even the authors knew that such an idea lay at the foundation of their own remarks. Those who do not think for themselves, possess notwithstanding the sharpness of insight to detect everything after it has already been shown them, in what has previously been said, where no one could before see it.

THE GENERAL QUESTION OF THE PROLEGOMENA.

IS METAPHYSICS POSSIBLE AT ALL?

§ 4.

Were metaphysics actually present as a science, one might say: Here is metaphysics, you only require to learn it, and it will convince you permanently and irresistibly of its truth. In that case the present question would be unnecessary, and there would only remain one which would more concern a testing of our acuteness, than a proof of the existence of the thing itself; namely, the question, How is it possible, and how is the Reason to set about attaining it? Unfortunately, in this case, human Reason is not in such a happy position. There is no single book that can be shown, like for instance Euclid, of which it can be said: This is metaphysics, herein is to be found the chief end of the science, the knowledge of a Supreme Being and of a future world, demonstrated upon principles of the pure Reason. It is possible, doubtless, to bring forward many propositions that are apodictically certain, and that have never been contested; but these are in their entirety analytic, and concern more the materials and the elements of construction, than the extension of knowledge, which is our special object in the present case. But even when synthetic propositions are produced (such as the principle of sufficient

Reason), which though they have never been proved from mere Reason, that is, *à priori*, as they ought to have been, are willingly admitted; even then, whenever it is attempted to make use of them for the main purpose, one is landed in such unstable and doubtful assertions, that it has always happened that one system of metaphysics has contradicted another, either in respect of the assertions themselves or their proofs, and has thus destroyed all claim to a lasting recognition. The very attempts made to establish the science have without doubt been the primary cause of the scepticism that so early arose, a mode of thought in which the Reason treats itself with such violence, that it would never have arisen but from the latter's utter despair of satisfying its chief aspirations. For long before man began methodically to question Nature, he interrogated his own isolated Reason, already practised, in a measure by common experience; because Reason is always present, while the laws of Nature generally require to be laboriously sought out. And so metaphysics floated to the surface like foam, and like foam, too, no sooner was it gathered up than it dissolved, while another mass of it appeared upon the scene which some were always found eager to grasp; while others, instead of seeking to penetrate the cause of the phenomenon in question, thought themselves wise in laughing at the futile exertions of the former.

The essential feature distinguishing pure mathematical knowledge from all other knowledge *à priori*, is that it does not proceed from conceptions themselves, but always through the construction of conceptions. (Critique, p. 435.) Since, therefore, in its propositions it must pass out of the conception to that containing the corresponding intuition, these can and ought never to arise from the dissection of conceptions, that is, analytically; in other words, they are, in their entirety, synthetic.

I cannot refrain from remarking on the disadvantage resulting to philosophy from a neglect of this simple and apparently insignificant observation. Hume, indeed, feeling it a task worthy of a philosopher, cast his eye over the whole field of pure knowledge *à priori* in which the human understanding claims such extensive possession. He, however, inconsiderately severed from it an

entire, and indeed the most important, province, namely, that of pure mathematics, under the impression that its nature, and, so to speak, its constitution, rested on totally different principles, that is, solely on the principle of contradiction; and although he did not make such a formal and universal division of propositions as is here done by me, or under the same name, yet it was as good as saying, pure mathematics contains simply analytic judgments, but metaphysics, synthetic judgments *à priori*. Now in this he made a great mistake, and this mistake had decidedly injurious consequences on his whole conception. For if he had not made it, he would have extended his question respecting the origin of our synthetic judgments far beyond his metaphysical conception of causality, and comprehended therein the possibility of mathematics *à priori*; for he must have regarded this as equally synthetic. But in the latter case he could, under no circumstances, have based his metaphysical propositions on mere experience, as he would then have been obliged to have subordinated the axioms of pure mathematics themselves to experience, a proceeding for which he was much too penetrating.

The good company into which metaphysics would then have been brought must have ensured it against contemptuous treatment; for the strokes aimed at the latter must have also hit the former, and this neither was nor could have been his intention. The result must have been to lead the acute man to considerations similar to those with which we are now occupied, but which must have gained infinitely by his inimitable style.

Essentially metaphysical judgments are, in their entirety, synthetic. We must distinguish between judgments belonging to metaphysics from metaphysical judgments proper. Among the former are comprised many that are analytic, but they only furnish the means for metaphysical judgments, these forming the entire purpose of the science, and being all synthetic. For when conceptions belong to metaphysics, as, for instance, that of substance, the judgments arising from their dissection belong also to metaphysics; e.g., substance is that which only exists as subject, &c., and many more similar analytic judgments, by

means of which an endeavour is made to approach the definition of the conception. Since, however, the analysis of a pure conception of the understanding (such as those metaphysics contains) cannot proceed differently from the analysis of any other conception (even an empirical one) not belonging to metaphysics (e.g., air is an elastic fluid, the elasticity of which is not destroyed by any known degree of cold), it follows that the conception but not the analytic judgment, is properly metaphysical. The science in question has something special and peculiar in the production of its cognitions *à priori*, which must be distinguished from what it has in common with all other cognitions of the understanding; so, for instance, the proposition, "all that is substance in things is permanent," is a synthetic and properly metaphysical judgment.

When the conceptions *à priori* constituting the materials of metaphysics have been previously collected according to fixed principles, the dissection of these conceptions is of great value. They can be then presented as a special department (as it were a *philosophia definitiva*), containing solely analytic propositions relating to metaphysics, though quite distinct from the synthetic, which constitute metaphysics itself. For, indeed, these analyses have nowhere any important use, except in metaphysics, that is, in reference to the synthetic propositions, to be generated from these dissected conceptions.

The conclusion drawn in this section is then, that metaphysics is properly concerned with synthetic propositions *à priori*, and that these alone constitute its purpose, but that, in addition to this, it requires frequent dissections of its conceptions, or analytic judgments, the procedure in this respect being only the same as in other departments of knowledge, where conceptions are sought to be made plain by analysis. But the *generation* of knowledge *à priori*, as much in intuition as in conceptions, in fine, synthetic propositions *à priori* in philosophical cognitions, make up the essential content of metaphysics.

Wearied, then, of the dogmatism that teaches us nothing, as well as of the scepticism that promises us nothing, not even the rest of a permissible ignorance, led on by the importance of the knowledge we need, rendered mistrustful

by a long experience, of all we believe ourselves to possess, or that offers itself in the name of pure Reason, there only remains one critical question, the answer to which must regulate our future procedure—*Is metaphysics possible at all?* But this question must not be answered by sceptical objections to particular assertions of any actual system of metaphysics (for we do not admit any at present), but from the, as yet, only problematical conception of such a science.

In the 'Critique of Pure Reason,' I went synthetically to work in respect of this question, in instituting researches into the pure Reason itself, and in this source endeavoured to determine the elements, as well as the laws of its pure use, according to principles. The task is difficult, and demands a resolute reader, gradually to think out a system, having no datum other than the Reason itself, and which, therefore, without supporting itself on any fact, seeks to unfold knowledge from its original germs. Prolegomena should, on the contrary, be preparatory exercises, designed more to show what has to be done, to realise a science as far as is possible, than to expound one. They must, therefore, rely on something known as trustworthy, from which we may with confidence proceed, and ascend to its sources, as yet unknown to us, and the discovery of which will not only explain what we already knew, but at the same time exhibit to us a range of many cognitions, all arising from these same sources. The methodical procedure of Prolegomena, especially of those destined to prepare a future system of metaphysics, will therefore be analytic.

Now it fortunately happens that, although we cannot accept metaphysics as a real science, we may assert with confidence that certain pure synthetic cognitions are really given *à priori*, namely, pure mathematics and pure natural science, for both contain propositions, partly apodictically certain through mere Reason, and partly recognised by universal consent as coming from experience, and yet as completely independent of it.

We have, then, at least some uncontested, synthetic knowledge *à priori*, and do not require to ask whether this is possible, since it is actual, but only—*How it is possible*, in order to be able to deduce from the principle, rendering possible what is already given, the possibility of all the rest.

GENERAL QUESTION.

HOW IS KNOWLEDGE POSSIBLE FROM PURE REASON?

§ 5.

We have already seen the important distinction between analytic and synthetic judgments. The possibility of analytic propositions can be very easily conceived, for they are based simply on the principle of contradiction. The possibility of synthetic propositions *à posteriori*, i.e., of such as are derived from experience, requires no particular explanation, for experience is nothing more than a continual adding together (synthesis) of perceptions. There remains, then, only synthetic propositions *à priori*, the possibility of which has yet to be sought for, or examined, because it must rest on other principles than that of contradiction.

But we do not require to search out the possibility of such propositions, that is, to ask whether they are possible, for there are enough of them, actually given, and with unquestionable certainty; and as the method we are here following is analytic, we shall assume at the outset that such synthetic but pure knowledge from the Reason, is real; but thereupon we must investigate the ground of this possibility and proceed to ask—How is this knowledge possible? in order that, from the principles of its possibility, we may be in a position to determine the conditions, the scope, and limits of its use. The proper problem, on which everything turns, when expressed with scholastic precision, will accordingly stand thus—HOW ARE SYNTHETIC PROPOSITIONS À PRIORI POSSIBLE?

In the above, for the sake of popularity, I have expressed the question somewhat differently, namely, as an inquiry after knowledge from pure Reason, which I could do on this occasion without detriment to the desired insight. For as we are here simply concerned with metaphysics and its sources, I hope, after the above remarks, readers will constantly bear in mind that, when we here speak of knowledge from pure Reason, we invariably refer to synthetic and never to analytic know-

ledge.[1] Upon the solution of this problem, the standing or falling of metaphysics, in other words, its very existence, entirely depends. Let any one lay down assertions, however plausible, with regard to it, pile up conclusions upon conclusions to the point of overwhelming, if he has not been able first to answer satisfactorily the above question, I have a right to say: It is all vain, baseless philosophy, and false wisdom. You speak through pure Reason, and claim to create *à priori* cognitions, inasmuch as you pretend not merely to dissect given conceptions but new connections which do not rest on the principle of contradiction, and which you think you conceive quite independently of all experience. How do you arrive at them, and how will you justify yourself in such pretensions? To appeal to the concurrence of the general common sense of mankind you cannot be allowed, for that is a witness whose reputation rests only on vulgar report.

> Quodcunque ostendis mihi sic, incredulus odi.
> (All that thou thus showest me, I disbelieve and hate.)
> Horat.

But indispensable as is the answer to this question, it is at the same time no less difficult, and although the chief cause why men have not long ago endeavoured to answer it, lies in the fact of its never having occurred to them that anything of the kind could be asked; there is a second cause, in that the satisfactory answer to this one question demands a more persistent, a deeper

[1] It is impossible to avoid certain expressions become classical, and which have originated in the infancy of science, being found inadequate and unsuitable as knowledge gradually progresses, and a newer and more appropriate terminology from standing in some danger of confusion with the older. Analytic method, in so far as it is opposed to synthetic, is something quite distinct from a complex of analytic propositions. The former merely means that we start from what is sought as if it were given, and ascend to the conditions under which it is alone possible. Upon this method we often use none but synthetic propositions, of which mathematical analysis affords an instance, and it might perhaps with more propriety be termed the *regressive* method, in contradistinction to the synthetic or *progressive*. A main department of logic is known as analytic, moreover, which means the logic of truth in contrast to dialectic, without any special reference to the analytic or synthetic character of the cognitions belonging to it.

and more laborious reflection than the most diffuse work, on metaphysics, the first appearance of which has given promise of immortal fame to its author. And every thoughtful reader, on attentively considering the requirement of this problem, frightened at the outset by its difficulty, would regard it as insoluble; and indeed, were it not for the actual existence of such pure synthetic cognitions *à priori*, as altogether impossible. This happened in the case of David Hume, although he did not place the problem before him in such generality by far as is here done, and as must be done if the answer is to be decisive for the whole of metaphysics. For how is it possible, said the acute man, that when a conception is given me, I can pass out of it, and connect it with another, which is not contained in the former, and indeed in such a manner as if it necessarily belonged to it? Only experience can present us with such connections (this he concluded from the difficulty which he mistook for an impossibility), and all this imagined necessity, or, what is the same thing, knowledge assumed to be *à priori*, is nothing but a long habit of finding something true, and thence of holding the subjective necessity for objective. If the reader complains of the difficulty and trouble I shall give him in the solution of this problem, let him only set about the attempt to solve it in an easier way. He will then perhaps feel obliged to one who has undertaken for him the labour of such deep research, and rather show some surprise at the facility with which the solution has been able to be given, when the nature of the subject is taken into account. It has cost years of trouble to solve this problem in its whole universality (in the sense in which mathematicians use this word, namely, as sufficient for all cases), and to be able finally to present it in analytic form, such as the reader will here find.

All metaphysicians are therefore solemnly and lawfully suspended from their occupations, till they shall have adequately answered the question—*How are synthetic cognitions à priori possible?* for in their answer alone consists the credentials they must produce, if they have aught to bring us in the name of pure Reason; in default of this, they can expect nothing else, than to be rejected, without

any further inquiry as to their productions, by sensible people who have been so often deceived.

If, on the other hand, they carry on their business not as a *science*, but as an art of wholesome persuasion, suitable to the general common sense of mankind, this calling cannot in fairness be denied them. In that case they will only use the modest language of a rational belief; they will admit that it is not allowed them even to *conjecture*, much less to *know*, anything, respecting that which lies beyond the boundaries of all possible experience, but merely to *assume* (not indeed for speculative use, for this they must renounce, but for purely practical purposes) what is possible and even indispensable for the direction of the understanding and will, in life. In this way alone can they possibly carry the reputation of wise and useful men, and they will do so the more in proportion as they renounce that of metaphysicians. For the object of the latter is to be speculative philosophers, and inasmuch as when we are concerned with judgments *à priori*, bare probabilities are not to be relied on (for what on its assumption is known *à priori*, is thereby announced as necessary), it cannot be allowed them to play with conjectures, but their assertions must be either *science*, or they are nothing at all.

It may be said that the whole transcendental philosophy which necessarily precedes all metaphysics is itself nothing more than the full solution in systematic order and completeness of the question here propounded, and that therefore as yet we have no transcendental philosophy. For what bears its name is properly a part of metaphysics, but the former science must first constitute the possibility of the latter, and must therefore precede all metaphysics. Considering, then, that a complete and in itself entirely new science, and one respecting which no aid is to be derived from other sciences, is necessary before a single question can be adequately answered, it is not to be wondered at if the solution of the same is attended with trouble and difficulty, and even perhaps with some degree of obscurity.

As we now proceed to this solution according to analytic method, in which we presuppose that such cognitions from pure Reason are real, we can only call to our aid two sciences of theoretic knowledge (with which alone we are

here concerned), namely, *pure mathematics* and *pure natural science*, for only these can present to us objects in intuition, and therefore (if a cognition *à priori* should occur in them) show their truth or agreement with the object *in concreto*, i.e., their reality; from which to the ground of their possibility we can proceed on the analytic road. This facilitates the matter very much, as the universal considerations are not merely applied to facts but even start from them, rather than as in synthetic procedure, being obliged to be derived, wholly *in abstracto*, from conceptions.

But from these real and at the same time well-grounded pure cognitions *à priori*, to rise to a possible one such as we are seeking, namely, to metaphysics as a science, we must needs embrace under our main question that which occasions it, to wit, the naturally given, though as regards its truth not unsuspicious, knowledge *à priori* lying at its foundation, and the working out of which, without any critical examination of its possibility, is now usually called metaphysics—in a word, the natural tendency to such a science; and thus the transcendental main question, divided into four other questions, will be answered step by step:—

1. *How is pure mathematics possible?*
2. *How is pure natural science possible?*
3. *How is metaphysics in general possible?*
4. *How is metaphysics as a science possible?*

It will be seen, that although the solution of these problems is chiefly meant to illustrate the essential contents of the Critique, it has nevertheless something special, which is of itself worthy of attention, namely, to seek the sources of given sciences in the Reason, in order to investigate and measure this, their faculty of knowing something *à priori*, by means of the act itself. In this way the particular science itself must gain, if not in respect of its content, at least as regards its right employment, and while it throws light on the higher question of its common origin, at the same time give occasion to better elucidating its own nature.

THE TRANSCENDENTAL MAIN QUESTION—FIRST PART.

How is pure Mathematics possible?

§ 6.

Here is a great and established branch of knowledge, already of remarkable compass, and promising unbounded extension in the future, carrying with it a thorough apodictic certainty, i.e., absolute necessity, and thus resting on no empirical grounds, but being a pure product of the Reason, besides thoroughly synthetic. "How is it possible for the human Reason to bring about such a branch of knowledge entirely *à priori?*" Does not this capacity, as it does not and cannot stand on experience, presuppose some ground of knowledge *à priori*, lying deep-hidden, but which might reveal itself through these its effects, if their first beginnings were only diligently searched for?

§ 7.

But we find that all mathematical knowledge has this speciality, that it must present its conception previously in *intuition*, and indeed *à priori*, that is, in an intuition that is not empirical but pure, without which means it cannot make a single step; its judgments therefore are always intuitive, whereas philosophy must be satisfied with *discursive* judgments out of mere conceptions; for though it can explain its apodictic doctrines by intuition, these can never be derived from such a source. This observation respecting the nature of mathematics, itself furnishes us with a guide as to the first and foremost condition of its possibility, namely, that *some pure intuition* must be at its foundation, wherein it can present all its conceptions *in concreto* and *à priori* at the same time, or as it is termed, *construct* them. If we can find out this pure intuition together with its possibility, it will be readily explicable how synthetic propositions *à priori* are possible in pure mathematics, and therefore, also, how

this science is itself possible. For just as empirical intuition enables us, without difficulty, to extend synthetically in experience the conception we form of an object of intuition, by new predicates, themselves afforded us by intuition, so will the pure intuition, only with this difference: that in the last case the synthetic judgment *à priori* is certain and apodictic, while in the first case it is no more than *à posteriori* and empirically certain, because the latter only contains what is met with in chance empirical intuition, but the former what is necessarily met with in the pure intuition, inasmuch as being intuition *à priori*, it is indissolubly bound up with the conception before all experience or perception of individual things.

§ 8.

But the difficulty seems rather to increase than to diminish by this step. For the question is now: How is it possible to intuite anything *à priori?* Intuition is a presentation, as it would immediately depend on the presence of the object. It seems therefore impossible to intuite originally *à priori*, because the intuition must then take place without either a previous or present object to which it could refer, and hence could not be intuition. Conceptions are indeed of a nature that some of them, namely, those containing only the thought of an object in general, may be very well formed *à priori*, without our being in immediate relation to the object (e.g., the conceptions of quantity, of cause, &c.), but even these require a certain use *in concreto*, i.e., an application to some intuition, if they are to acquire sense and meaning, whereby an object of them is to be given us. But how can intuition of an object precede the object itself?

§ 9.

Were our intuition of such a nature as to present *things as they are in themselves*, no intuition *à priori* would take place at all, but it would always be empirical. For what is contained in the object in itself, I can only know when it is given and present to me. It is surely then inconceivable how the intuition of a present thing should

enable me to know it as it is in itself, seeing that its properties cannot pass over into my presentative faculty. But granting the possibility of this, the said intuition would not take place *à priori*, that is, before the object was presented to me, for without it no ground of connection between my presentation and the object could be imagined; in which case it must rest on inspiration (*Eingebung*). Hence there is only one way possible, by which my intuition can precede the reality of the object and take place as knowledge *à priori*, and that is, if it contain nothing else but that form of sensibility which precedes in my subject all real impressions, by which I am affected by objects. For, that objects of sense can only be intuited in accordance with this form of sensibility, is a fact I can know *à priori*. From this it follows, that propositions merely concerning the form of sensible intuition, will be valid and possible for all objects of sense; and conversely, that intuitions possible *à priori*, can never concern other things than objects of our sense.

§ 10.

Hence, it is only by means of the form of sensuous intuition that we can intuite things *à priori*, but in this way we intuite the objects only as they appear to our senses, not as they may be in themselves; an assumption absolutely necessary if synthetic propositions *à priori* are to be admitted as possible, or in the event of their being actually met with, if their possibility is to be conceived and defined beforehand.

Now, such intuitions are space and time, and these lie at the basis of all the cognitions and judgments of pure mathematics, exhibiting themselves at once as apodictic and necessary. For mathematics must present all its conceptions primarily in intuition, and pure mathematics in pure intuition, i.e., it must construct them. For without this it is impossible to make a single step, so long, that is to say, as a pure intuition is wanting, in which alone the matter of synthetic judgments *à priori* can be given; because it cannot proceed analytically, that is, by the dissection of conceptions, but is obliged to proceed synthetically.

The pure intuition of space constitutes the basis of geometry—even arithmetic brings about its numerical conceptions by the successive addition of units in time; but above all, pure mechanics can evolve its conception of motion solely with the aid of the presentation of time. Both presentations, however, are mere intuitions; for when all that is empirical, namely, that belongs to feeling, is left out of the empirical intuitions of bodies and their changes (motion), space and time still remain over, and are therefore pure intuitions, lying *à priori* at the foundation of the former. For this reason, they can never be left out, but being pure intuitions *à priori*, prove that they are the bare forms of our sensibility, which must precede all empirical intuition, i.e., the perception of real objects, and in accordance with which objects can be known *à priori*, though only as they appear to us.

§ 11.

The problem of the present section is therefore solved. Pure mathematics is only possible as synthetic knowledge *à priori*, in so far as it refers simply to objects of sense, whose empirical intuition has for its foundation a pure intuition *à priori* (that of time and space), which intuition is able to serve as a foundation, because it is nothing more than the pure form of sensibility itself, that precedes the real appearance of objects, in that it makes them in the first place possible. Yet this faculty of intuiting *à priori* does not concern the matter of the phenomenon, i.e., that which is feeling (*Empfindung*) in the latter, for this constitutes the empirical element therein; but only its form, space and time. Should anybody cast the least doubt on the fact that neither of them are conditions of things in themselves, but only dependent on their relation to sensibility, I should be glad to be informed how he deems it possible to know *à priori*, and therefore before all acquaintance with the things, that is, before they are given us, how their intuition must be constructed, as is here the case with space and time. Yet this is quite conceivable, as soon as they both count for nothing more than formal determinations of our sensibility, and the objects merely as phenomena, for in that case the form of the phenomenon,

that is, the pure intuition, can be conceived as coming from ourselves, in other words, as *à priori*.

§ 12.

To contribute something to the explanation and confirmation of the above, we have only to consider the ordinary and necessary procedure of geometricians. All the proofs of complete likeness between two given figures, turn at last upon the fact of their covering each other; in other words, of the possibility of substituting one, in every point, for the other, which is obviously nothing else but a synthetic proposition resting on immediate intuition. Now this intuition must be given pure and *à priori*, for otherwise the proposition in question could not count as apodictically certain, but would possess only empirical certainty. We could only say in that case, it has been always so observed, or it is valid so far as our perception has hitherto extended. That complete space, itself no boundary of a further space, has three dimensions, and that no space can have more than this number, is founded on the proposition that not more than three lines can bisect each other at right angles in a single point. But this proposition cannot be presented from conceptions, but rests immediately on intuition, and indeed on pure *à priori* intuition, because it is apodictically certain that we can require a line to be drawn out to infinity (*in indefinitum*), or that a series of changes (e.g., spaces passed through by motion) shall be continued to infinity, and this presupposes a presentation of space and time, merely dependent on intuition, namely, so far as in itself, it is bounded by nothing, for from conceptions it could never be concluded. Pure intuitions *à priori*, then, really lie at the foundation of mathematics, and these make its synthetic and apodictically valid propositions possible, and hence our transcendental deduction of conceptions in space and time explains at the same time the possibility of pure mathematics, which without such a deduction, and without our assuming that "all which can be given to our senses (the outer in space, the inner in time) is only intuited by us, as it appears to us, and not as it is in itself," might indeed be conceded, but could in nowise be understood.

§ 13.

Those who are unable to free themselves from the notion, that space and time are real qualities (*Beschaffenheiten*) appertaining to the things in themselves, may exercise their wits on the following paradoxes, and when they have in vain attempted their solution, may suppose, being freed from their prejudices at least for a few moments, that perhaps the degradation of space and time to the position of mere forms of our sensible intuition, may have some foundation.

When two things are exactly alike [equal] in all points that can be cognised in each by itself (i.e., in all respecting quantity or quality), it must follow, that one can in all cases and relations be put in the place of the other, without this substitution occasioning the least cognisable difference. This indeed applies to plane figures in geometry; but there are many spherical figures, which in spite of this complete internal agreement exhibit in their external relations an agreement falling short of admitting one to be put in the place of the other.

For instance, two spherical triangles on opposite hemispheres, having an arc of the equator as a common base, are perfectly equal both in respect of their sides and their angles, so that in neither of them, if separately and at the same time completely described, would anything be found which was not equally present in the other; and yet notwithstanding this, one cannot be put in the place of the other, i.e., on the opposite hemisphere, and herein consists the internal difference of both triangles, that no understanding can indicate as internal, but which reveals itself only by means of the external relation in space. I will now adduce some more ordinary cases taken from common life.

What can more resemble my hand or my ear, and be in all points more like, than its image in the looking-glass? And yet I cannot put such a hand as I see in the glass in the place of its original; for when the latter is a right hand, the one in the glass is a left hand, and the image of the right ear is a left one, which can never take the place of the former. Now, here there are no internal differences

that could be imagined by any understanding. And yet the differences are internal, so far as the senses teach us, for the left hand cannot, despite all equality and similarity, be enclosed within the same bounds as the right (they are not congruent); the glove of one hand cannot be used for the other. What then is the solution? These objects are not presentations of things as they are in themselves, and as the pure understanding would cognise them, but they are sensuous intuitions, i.e., phenomena, the possibility of which rests on the relations of certain unknown *things in themselves* to something else, namely, to our sensibility. Now, space is the form of the outward intuition of these, and the inward determination of every space is only possible through the determination of outward relations to the whole space, of which each [separate] space is a part (i.e., by its relation to the outward sense); in other words, the part is only possible through the whole, which though it could never be the case with things in themselves, namely, with objects of the mere understanding, can very well be so with mere phenomena. Hence we can render the difference of similar and equal, though incongruent things (e.g., spirals winding opposite ways[1]) intelligible by no single conception, but only by the relation of the right and left hands, which refers immediately to intuition.

REMARK I.

Pure mathematics, and especially pure geometry, can only possess objective reality under the condition that they merely refer to objects of sense, in view of which, however, the axiom holds good that our sensuous presentation is in nowise a presentation of things in themselves, but only of the manner wherein they appear to us. Hence it follows that the propositions of geometry are not the mere determinations of a creation of our poetic fancy, which therefore cannot be referred with confidence to real objects, but that they are necessarily valid of space, and

[1] Among the curiosities of literature may be counted Richardson's translation of the above passage, as "snails wound round contrary to all sense."—Tr.

consequently of everything that may be found in space; because space is nothing more than the form of all external phenomena, under which alone objects of sense can be given us. Sensibility, the form of which lies at the foundation of geometry, is that whereon the possibility of external phenomena rests; so these can never contain anything but what geometry prescribes for them. It would be quite different if the senses had to present the objects as they are in themselves. For in that case it would by no means follow from the presentation of space (which the geometrician posits with all its properties as an *à priori* basis), that all this, together with what is deduced therefrom, is exactly so constituted in Nature. The space of the geometrician would be regarded as a mere fiction, and no objective validity ascribed to it, because we do not see why things must necessarily conform to the image that we make of them spontaneously and beforehand. But when this image, or rather this formal intuition, is the essential property of our sensibility by means of which alone objects are presented to us; and yet this sensibility presents not things in themselves, but only their appearances, it is quite easy to conceive, and at the same time incontrovertibly proved, that all the external objects of our sense-world must necessarily conform with the most complete accuracy to the propositions of geometry. For sensibility, by its form of external intuition (space) with which the geometrician is occupied, makes those objects themselves (though as mere appearances) primarily possible. It will always remain a remarkable phenomenon in the history of philosophy that there has been a time when even mathematicians who were also philosophers began to doubt, not indeed of the correctness of their propositions in so far as they concerned space, but of the objective validity and application of this conception, with all its geometrical determinations, to Nature. They were concerned lest a line in Nature might consist of physical points, and the true space in the object, accordingly of simple parts, whereas the space the geometrician has in his mind can never consist of such. They did not recognise that this space in thought makes the physical space, i.e., the extension of matter, itself possible; that

the latter is no quality of things in themselves, but only a form of our sensible faculty of presentation; that all objects in space are mere phenomena, i.e., are not things in themselves, but presentations of our sensuous intuition; and hence that space, as the geometrician thinks it, is exactly the form of sensuous intuition we find *à priori* in ourselves, containing the ground of possibility of all external phenomena (as regards their form); and that these must necessarily and in the most exact manner agree with the propositions of the geometrician, which he draws from no fictitious conception, but from the subjective foundation of all external phenomena, namely, the sensibility itself. In such and no other manner can the geometrician be ensured as to the indubitable objective reality of his propositions against all the cavils of an arid metaphysics, however strange it may seem to him, owing to his not having reverted to the sources of his conceptions.

REMARK II.

All that is given us as object, must be given us in intuition. But all our intuition takes place by means of the senses alone; the understanding intuites nothing, but only reflects. Inasmuch then as the senses, according to what is above observed, never enable us to cognise, not even in one single point, the things in themselves, but only their phenomena, while these are mere presentations of sensibility, "all bodies, together with the space in which they are found, must be held to be nothing but mere presentations, existing nowhere but in our thoughts." Now is this not the plainest idealism?

Idealism consists in the assertion that there exist none but thinking entities; the other things we think we perceive in intuition, being only presentations of the thinking entity, to which no object outside the latter can be found to correspond. I say, on the contrary, things are given as objects discoverable by our senses, external to us, but of what they may be in themselves we know nothing; we know only their phenomena, i.e., the presentations they produce in us as they affect our senses. I therefore certainly admit that there are bodies outside

us, that is, things, which although they are wholly unknown to us, as to what they may be in themselves, we cognise through presentations, obtained by means of their influence on our sensibility. To these we give the designation of body, a word signifying merely the phenomenon of that to us unknown, but not the less real, object. Can this be termed idealism? It is indeed rather the contrary thereof.

That without calling in question the existence of external things, it may be said of a number of their predicates that they do not belong to the things in themselves, but only to their phenomena, and have no self-existence outside our presentation, is what had been generally accepted and admitted long before Locke's time, but more than ever since then. To these belong heat, colour, taste, &c. No one can adduce the least ground for saying that it is inadmissible on my part, when for important reasons I count in addition the remaining qualities of bodies called *primaries*, such as extension, place, and more especially space, together with what is dependent thereon (impenetrability or materiality, figure, &c.) amongst the number of these phenomena. And just as little as the man who will not admit colours to be properties of the object in itself, but only to pertain as modifications to the sense of sight, is on that account called an idealist, so little can my conception be termed idealistic because I find in addition that *all properties which make up the intuition of a body* belong merely to its appearance. For the existence of a thing, which appears, is not thereby abolished as with real idealism, but it is only shown that we cannot cognise it, as it is in itself, through the senses.

I should like to know how my assertions must be fashioned, if they are not to contain an idealism. I should doubtless have to say, that the presentation of space is not alone completely in accordance with the relation of our sensibility to objects, for that I have already said, but that it is exactly similar to the object itself; an assertion to which no sense can be attached, just as little as that the feeling of red has a similarity with the cinnabar producing this feeling in me.

Remark III.

Hence we may readily set aside an easily foreseen but pointless objection: namely, that through the ideality of space and time, the whole sense-world would be changed to sheer illusion. All philosophical insight into the nature of sensuous cognition was ruined from the first by making sensibility to consist simply in a confused mode of presentation, by which we cognise the things as they are, without having the capacity to bring everything in this, our cognition, to clear consciousness. On the other hand, it has been proved by us that sensibility does not consist in this logical distinction of clearness and obscurity, but in the genetic distinction of the origin of knowledge itself, since sensuous cognition does not present the things as they are, but only the manner in which they affect our senses; and that therefore through them mere phenomena, and not the things themselves, are given to the understanding for reflection. After this necessary correction, a consideration presents itself, arising from an inexcusable and almost purposeless misapplication, as though my doctrine changed all the objects of sense into mere illusion.

When an appearance is given us we are quite free as to what we thence infer with regard to the matter. The former, namely, the appearance, rests on the senses, but the judgment on the understanding; and the only question is, whether or not there is truth in the determination of the object. But the distinction between truth and dream is not decided by the construction of the presentations, which are referred to objects, for they are alike in both, but by the connection of the same according to the rules determining the coherence of presentations in the conception of an object, and by whether they can stand together in an experience or not. Hence the fault does not lie with the phenomena, if our cognition takes the illusion for truth, i.e., if an intuition, whereby an object is given, is held to be the conception of the object or its existence, which the understanding alone can cogitate. The senses present to us the course of the planets as first forwards and then backwards, and in this there is neither falsehood nor truth, because so long as it is considered as

an appearance only, no judgment is yet formed as to the objective character of their motion. But inasmuch as when the understanding does not take great care lest this subjective mode of presentation be held for objective, a false judgment may easily arise; it is said, they *seem* to go back; the illusion, however, is not to be laid to the account of the senses, but of the understanding, whose province alone it is to form an objective judgment on the phenomenon.

In this manner, even if we did not reflect on the origin of our presentations, and let our intuitions of sense contain what they may, if it be but connected according to the coherence of all knowledge in an experience, [we shall find that] deceptive illusion or truth will arise according as we are negligent or careful; for it concerns solely the use of sensuous presentations in the understanding, and not their origin. In the same way, if I hold all presentations of sense together with their form, namely, space and time, to be nothing but phenomena, and the latter to be a mere form of sensibility not present in the objects external to it, and I make use of these presentations only in reference to a possible experience, there is not therein the least temptation to error, neither is there an illusion implied in my regarding them as mere appearances; for in spite of this they can rightly cohere according to the rules of truth in an experience. In such wise all the propositions of geometry respecting space are valid just as much of all the objects of sense, and therefore in respect of all possible experience, whether I regard space as a mere form of sensibility or as something inhering in the things themselves. But in the first case alone can I conceive *how* it is possible to know *à priori* the above propositions concerning objects of external intuition. Otherwise everything remains in respect to all merely possible experience just as though I had never undertaken this departure from the popular judgment.

But, let me only venture with my conceptions of space and time beyond all possible experience, which is unavoidable if I give them out as qualities appertaining to the things in themselves (for what should prevent me from assuming them as valid of these same things, even though my senses were differently constructed, and whether they were suited to them or not?) then a serious error may

arise, resting on an illusion giving out as universally valid what is a mere condition of the intuition of things pertaining to my subject (certain for all the objects of sense, and thereby for all possible experience), because I refer them to things in themselves and fail to limit them to the conditions of experience.

So far, then, from my doctrine of the ideality of space and time reducing the whole sense-world to mere illusion, it is rather the only means of ensuring the application of some of the most important cognitions, namely, those propounded *à priori* by mathematics, to real objects, and of guarding them from being held as illusion. For without this observation it would be quite impossible to ascertain whether the intuitions of space and time we borrow from no experience, but which nevertheless lie *à priori* in our faculty of presentation, were not mere self-made cobwebs of the brain, to which no object, or at least no adequate object, corresponded, and geometry itself therefore a mere illusion; instead of which, its incontestable validity in respect of all objects of the sense-world, owing to these being simply phenomena, has been able to be demonstrated by us.

Secondly, so far from my principles, because they reduce the presentations of the senses to phenomena, turning the truth of experience into illusion, they are rather the only means of guarding against the transcendental illusion, whereby metaphysics has always been deceived and misled into childish endeavours to grasp at soap-bubbles, by taking phenomena, which are mere presentations, for things in themselves; whence have resulted the remarkable assumptions of the antinomy of the Reason, of which I shall make mention farther on, and which are abolished by the single observation that appearance, as long as it is used simply in experience, produces truth, but as soon as it passes beyond the bounds of the latter and becomes transcendent, nothing but pure illusion.

Inasmuch, then, as I leave their reality to the things we intuite to ourselves through the senses, and only limit our sensuous intuition of those things in that they in no particular, not even in the pure intuitions of space and time, represent more than the appearance of the above things, and never their constitution as they are in them-

selves; this is no thorough-going illusion of my own invention [applied to] Nature. My protestation against all supposition of an idealism is so decisive and clear, that it might seem superfluous were it not for incompetent judges, who like to have an old name for every departure from their distorted although common opinion, and who never judge of the spirit of philosophical terminology, but cling simply to the letter, being ready to put their own delusion in the place of well-defined perceptions, and so to distort and deform them. For the fact of my having myself given my theory the name of transcendental idealism, can justify no one in confounding it with the idealism of Descartes (though this was only a problem, on account of whose insolubility every one was free, in the opinion of Descartes, to deny the existence of the bodily world, because it could never be satisfactorily solved), or with the mystical and visionary idealism of Berkeley, against which and other similar cobwebs of the brain our Critique rather contains the best specific. For what is by me termed idealism, does not touch the existence of things (the doubt of the same being what properly constitutes idealism in the opposite sense), for to doubt them has never entered my head, but simply concerns the sensuous presentation of things, to which space and time chiefly belong; and of these and of all phenomena I have only shown that they are neither things (but only modes of presentation), nor determinations belonging to things in themselves. But the word transcendental, which with me never implies a reference to our *knowledge* of things, but only to our *faculty of knowledge* (*Erkenntnissvermögen*) should guard against this misconception. Rather, however, than occasion its further continuance, I prefer to withdraw the expression, and let it be known as critical (idealism). If it be indeed an objectionable idealism, to change into mere presentations real things (not phenomena), what name shall be applied to that which conversely turns mere presentations into things? I think we may term it the *dreaming* idealism, in contradistinction to the foregoing, that may be termed the *visionary*, but both of which ought to have been obviated by my elsewhere so-called transcendental, but better, *critical*, idealism.

THE SECOND PART OF THE MAIN TRANSCENDENTAL PROBLEM.

How is pure Natural Science possible?

§ 14.

Nature is the existence of things, in so far as it is determined according to universal laws. If Nature signified the existence of *things in themselves*, we could never know it either *à priori* or *à posteriori*. Not *à priori*, for how shall we know what applies to things in themselves? since this can never be done by the dissection of our conceptions (analytic propositions). For what I want to know, is not what is contained in my conception of a thing (for that concerns its logical nature), but what in the reality of the thing is superadded to this conception, by which the thing itself is determined outside my conception. My understanding and the conditions under which alone it can connect the determination of things in their existence, prescribes no rules for the things in themselves; these do not conform themselves to my understanding, but my understanding conforms itself to them. They must therefore be previously given me, in order for these determinations to be discovered in them; and in this case they would not be known *à priori*.

But *à posteriori* such a knowledge of the nature of things in themselves would be equally impossible. For if experience is to teach me laws to which the existence of things is subordinated, these must, in so far as they concern things in themselves, of necessity also apply to them outside my experience. Now experience teaches me, indeed, what exists and how it exists, but never that it exists necessarily in such a manner and no other. It can never, therefore, teach the nature of things in themselves.

§ 15.

We are nevertheless really in possession of a pure natural science, which *à priori* and with all the necessity requisite to apodictic propositions, puts forward laws to which Nature is subordinated. I only require here to

call to witness that propaedeutic, which, under the title of universal natural science, precedes all physical science based on empirical principles. Therein we find mathematics applied to phenomena, also those discursive principles (from conceptions) constituting the philosophical part of pure natural knowledge. But the latter also contains much that is not pure, and independent of the sources of experience, as the conception of motion, of impenetrability (on which the empirical conception of matter rests), of inertia and others, which prevent its being called a perfectly pure natural science. Besides, it is only concerned with the objects of the external sense, and thus furnishes no example of a pure natural science in its strictest meaning; for this would have to bring Nature generally under universal laws, irrespective of whether it concerned the object of the outer or of the inner sense of physical science, or of psychology. But among the principles of the above universal physical science are to be found some that really possess the universality we require, as the proposition that *substance continues and is permanent*, and that all which happens is at all times previously *determined by a cause*, according to fixed laws. These are really universal natural laws, existing completely *à priori*. There is then in fact a pure natural science, and now the question arises—*how is it possible?*

§ 16.

The word Nature further assumes another meaning, which defines the object, whereas in the above meaning the mere regularity of the existence of the determinations of things generally, is denoted. Nature considered *materialiter* is *the sum-total of all the objects of experience.* With this we are alone concerned at present, for things which could never be objects of an experience were they to be known according to their nature, would necessitate us to form conceptions, to which meaning could never be given *in concreto* (in any example from a possible experience), and of the nature of which we should be obliged to make conceptions alone, whose reality, that is, whether they really referred to objects or were mere figments of thought, could never be decided. With that which can-

not be an object of experience, the knowledge of which would be hyperphysical, or anything like it, we have here nothing at all to do, but only with the natural knowledge whose reality can be confirmed by experience, notwithstanding its being *à priori* possible, and preceding all experience.

§ 17.

The *formal* in Nature, in this narrower signification, is then the regularity of all the objects of experience, and in so far as they are known *à priori*, their *necessary* regularity. But it has been just demonstrated that the laws of Nature can never be known *à priori* in objects, in so far as they are considered not as the objects of a possible experience but as things in themselves. We are not here concerned with things in themselves (the qualities of which we put on one side), but merely with things as the objects of a possible experience, and the sum-total of which is properly what we call Nature. And I now ask, whether, if the question be as to the possibility of a cognition of Nature *à priori*, it would be better to formulate the problem, as follows: How is it possible to cognise *à priori* the necessary regularity of things as objects of experience? or, How is the necessary regularity of experience itself in respect of all its objects, generally [possible to be cognised *à priori*]?

Seen in its true light, the solution of the problem, whether presented in the one or in the other form, in respect of the pure cognition of Nature (which constitutes the real point of the question) is in the end altogether the same. For the subjective laws under which alone an experiential cognition of things is possible, are valid also of those things as objects of a possible experience (though not indeed as things in themselves; but the latter we are not here considering). It is quite the same, then, whether I say: Without the law—that on an event being perceived, it must invariably be referred to something preceding it, upon which it follows according to a universal rule—a judgment of perception can never avail as experience; or whether I express myself thus: Everything that experience teaches us, happens, must have a cause.

It is, however, advisable to choose the first formula. For as we can have a knowledge *à priori* and before all

given objects, of those conditions under which alone an experience in respect of them is possible, but never of what laws, they, without reference to a possible experience, are subordinated to, in themselves; we shall not be able to study the nature of things *à priori*, otherwise than by investigating the conditions and universal (although subjective) laws, under which such a knowledge is alone possible (in respect of mere form), as experience, and in accordance therewith determine the possibility of things as objects of experience. Were I to choose the second mode of expression and seek the conditions *à priori* under which Nature is possible as an object of experience, I should easily be led into misunderstanding, and fancy I had to explain Nature as a thing in itself, and I should then be fruitlessly involved in endless endeavours to seek laws for things of which nothing is given me.

We shall here, therefore, be simply concerned with experience, and the universal and *à priori* given conditions of its possibility, and thence determine Nature as the complete object of all possible experience. I think it will be understood, that I do not refer to the rules for the observation of a nature already given, which presuppose experience, or how through experience we can arrive at the laws of Nature, for these would not then be laws *à priori*, and would give no pure science of Nature; but how the conditions *à priori* of the possibility of experience are at the same time the sources from which all the universal laws of Nature must be derived.

§ 18.

We must first of all observe then, that, although all the judgments of experience are empirical, i.e., have their ground in the immediate perception of sense, yet on the other hand all empirical judgments are not judgments of experience, but that beyond the empirical, and beyond the given sensuous intuition generally, special conceptions must be superadded, having their origin entirely *à priori* in the pure understanding, under which every perception is primarily subsumed, and by means of which only it can be transformed into experience.

Empirical judgments, in so far as they have objective validity, are JUDGMENTS OF EXPERIENCE; but those which are merely *subjectively valid* I call judgments of perception. The last require no pure conception of the understanding; but only the logical connection of perception in a thinking subject. But the first demand, above the presentations of sensuous intuition, *special conceptions originally generated in the understanding*, which make the judgment of experience objectively valid.

All our judgments are at first mere judgments of perception; they are valid simply for us, namely, for our subject. It is only subsequently that we give them a new reference, namely, to an object, and insist that they shall be valid for us always, as well as for every one else. For when a judgment coincides with an object, all judgments must both coincide with the same object and with one another, and thus the objective validity of the judgment of experience implies nothing more than the necessary universal validity of the same. But, on the other hand, when we see reason to hold a judgment of necessity universally valid (which never hinges on the perception itself, but on the pure conception of the understanding under which the perception is subsumed), we are obliged to regard it as objective, i.e., as expressing not merely the reference of the perception to a subject but a quality of the object: for there would be no reason why the judgments of other persons must necessarily coincide with mine, if it were not that the unity of the object to which they all refer, and with which they coincide, necessitates them all agreeing with one another.

§ 19.

Objective validity and necessary universality (for every one) are therefore exchangeable notions, and although we do not know the object in itself, yet when we regard a judgment as at once universal and necessary, objective validity is therewith understood. We cognise in this judgment the object (though it remain unknown what it is in itself) by the universal and necessary connection of

given perceptions, and as this is the case with all objects of sense, judgments of experience owe their objective validity not to the immediate cognition of the object (for this is impossible), but merely to the condition of universality in the empirical judgment, which, as has been said, never rests on empirical, or on any sensuous conditions, but on a pure conception of the understanding. The object in itself always remains unknown; but when through the conception of the understanding, the connection of the presentations given to our sensibility by the latter is determined as universally valid, the object is determined by this relation, and the judgment is objective.

We will explain this; that the room is warm,[1] the sugar sweet, the wormwood bitter, are merely subjectively valid judgments. I do not expect that I shall always, or that every other person, will find them as I do now. They only express a reference of two sensations to the same subject, namely, myself, and that only in my present state of perception, and are not therefore valid of objects. I call these judgments of perception. With judgments of experience the case is altogether different. What experience teaches me under certain circumstances, it must teach me at all times, and every other person as well; its validity is not limited to the subject or to the state of the latter at a particular time. I pronounce, therefore, all such judgments to be objectively valid. For instance when I say—the air is elastic, this judgment is immediately a judgment of perception, since I only refer the feelings in my senses to one another. If I insist it shall be called a judgment of experience, I expect this connection to stand under a condition making it universally valid. I insist,

[1] I readily admit that these instances do not present judgments of perception that ever could become judgments of experience, even if a conception of the understanding were added to them, because they refer to mere feeling, which every one recognises to be merely subjective, and as such never predicable of the object, and thus never capable of becoming objective. I only desire at present to give an instance of a judgment subjectively valid, but containing in itself no ground of necessity, and thereby no reference to an object. An example of judgments of perception becoming judgments of experience by the addition of a conception of the understanding follows in the next remark.

that is, that I at all times and every other person, shall necessarily so combine the same perceptions, under the same circumstances.

§ 20.

We must therefore dissect experience, in order to see what is contained in this product of sense and understanding, and how the judgment of experience itself is possible. The intuition of which I am conscious, namely, perception (*perceptio*), which merely belongs to the senses, lies at its foundation. But secondly, judgment (which pertains solely to the understanding) also belongs to it. This [act of] judgment may be twofold; firstly, I may simply compare the perceptions in a particular state of my own consciousness; or secondly, I may combine them in a consciousness in general. The first judgment is a simple judgment of perception, and has therefore only subjective validity, being the mere connection of perceptions in my mental state, without reference to the object. Hence it is not sufficient for experience, as is commonly imagined, to compare perceptions and to connect them in a consciousness by means of the judgment. No universality and necessity in the judgment can arise therefrom, by means of which alone it can be objectively valid, and experience.

There is another and quite a different judgment presupposed, before perception can become experience. The given intuition must be subsumed under a conception determining the form of the judgment generally in respect of the intuition, connecting the empirical consciousness of the last in a consciousness in general, and thereby obtaining universality for the empirical judgment; such a conception is a pure *à priori* conception of the understanding, that does nothing but determine for an intuition the general manner in which it can serve for judgment. Should the conception be that of cause, it determines the intuition subsumed under it in respect of judgment generally; for instance, in the case of air, that in respect of expansion, it stands in the relation of antecedent to consequent, in a hypothetical judgment. The conception of cause is then a pure con-

ception of the understanding, entirely distinct from all possible perception, and only serves to determine that presentation contained under it, in respect of judgment generally, in short, to make a universally valid judgment possible.

Now, before a judgment of perception can become a judgment of experience, it is first of all necessary that the perception be subsumed under these conceptions of the understanding. For instance, air belongs to the conception of causes, which determines the judgment regarding its extension, as hypothetical.[1] In this way, the extension is represented not merely as belonging to my perception of air in my particular state, or in many of my states, or in a particular state of the perception of others, but as *necessarily* belonging thereto; and the judgment, the air is elastic, becomes universally valid, and therefore a judgment of experience, preceded by certain judgments, which subsume the intuition of air under the conception of cause and effect, and thereby the perceptions, not merely with respect to one another in my subject, but relatively to the form of judgment generally (here the hypothetical), and thus make the empirical judgment universally valid.

If we dissect all our synthetic judgments, in so far as they are valid objectively, we shall find that they never consist of mere intuitions, connected (as is commonly believed) through comparison in a judgment, but that they would be impossible were there not beyond the conceptions drawn from experience, a pure conception of the understanding, under which the former conceptions are subsumed, and in this way only, connected in an objectively valid judgment. Even the judgments of pure

[1] As a more readily comprehensible example, the following may be taken. When the sun shines on the stone it grows warm—this judgment is a mere judgment of perception and contains no necessity, no matter how often I or others have perceived it. The perceptions only find themselves usually so combined. If I say the sun warms the stone the conception of the understanding, cause, is superadded to the perception, which with the conception of sunshine necessarily connects that of warmth, when the synthetic judgment becomes of necessity universally valid, consequently objective, and thus a perception is transformed into experience.

mathematics in their simplest axioms, are not excepted from this condition. The axiom, the straight line is the shortest way between two points, presupposes that the line be subsumed under the conception of quantity, which is assuredly no intuition, but has its seat in the understanding, and serves to determine the intuition (the line) in the reference of the judgment that may be made regarding it, in respect of its quantity, namely, of plurality (as *judicia plurativa*),[1] inasmuch as it is thereby understood that in a given intuition, many homogeneous parts are contained.

§ 21.

In order to demonstrate the possibility of experience, in so far as it rests on pure *à priori* conceptions of the understanding, we must first present what belongs to judgment generally, and the various momenta of the understanding in the same, in a complete table, for the pure conceptions of the understanding, which are nothing more than conceptions of intuitions in general, in so far as these are determined in themselves by one or other of these momenta of judgment, that is, are necessarily and universally valid, must run exactly parallel to them [viz., these momenta]. In this way, the axioms *à priori* of the possibility of all experience as an objectively valid empirical cognition, are precisely determined. For they are nothing but propositions, subsuming all perception (in accordance with certain universal conditions of perception), under the above pure conceptions of the understanding.

[1] I prefer to call the judgments by this name, which are known in logic as *particularia*, for this expression implies the notion that they are not universal. When I commence at unity in singular judgments and proceed to universality, I must not introduce any reference to universality; I think merely of plurality without totality, not of its exception. This is necessary if the logical momenta are to be the basis of the pure conceptions of the understanding; in logical use the matter may be left as heretofore.

LOGICAL TABLE OF THE JUDGMENTS.

1.	2.
According to Quantity.	*According to Quality.*
Universal.	Affirmative.
Particular.	Negative.
Singular.	Infinite.
3.	4.
According to Relation.	*According to Modality.*
Categorical.	Problematical.
Hypothetical.	Assertorical.
Disjunctive.	Apodictic.

TRANSCENDENTAL TABLE OF THE CONCEPTIONS OF THE UNDERSTANDING.

1.	2.
According to Quantity.	*According to Quality.*
Unity (the measure).	Reality.
Plurality (the amount).	Negation.
Totality (the whole).	Limitation.
3.	4.
According to Relation.	*According to Modality.*
Substance.	Possibility.
Cause.	Actuality.
Community.	Necessity.

PURE PHYSIOLOGICAL TABLE OF THE UNIVERSAL PRINCIPLES OF NATURAL SCIENCE.

1.

Axioms of Intuition.

2.	3.
Anticipations of Perception.	Analogies of Experience.

4.

Postulates of Empirical Thought in general.

§ 21*a*.

In order to grasp the preceding in a single notion, it is necessary to remind the reader that we are not here speaking of the origin of experience, but of that which lies within it. The first belongs to empirical psychology, and would exist without the second, which belongs to the critique of cognition, and especially to that of the understanding, and can never be sufficiently developed.

Experience consists of intuitions, belonging to sensibility, and of judgments which are entirely the work of the understanding. But the judgments the understanding constructs merely out of sensuous intuitions, are not, by far, judgments of experience. For in the one case the judgment simply connects the perceptions, as they are given in sensuous intuition; but in the other, the judgments must say what experience generally contains, and not what the mere perception, the validity of which is purely subjective, contains. The judgment of experience must add something to a judgment, over and above the sensuous intuition, and the logical connection of the same (after it has been made universal by comparison), something that determines the synthetic judgment, as at once necessary and thereby universally valid; and this can be nothing else but that conception which presents the intuition as determined in itself, in respect to one form of judgment rather than another, i.e., a conception of that synthetic unity of intuitions, which can only be presented through a given logical function of the judgment.

§ 22.

The sum of the above is this: the business of the senses is to intuite, that of the understanding to think. But to think is to unite presentations in a consciousness. This union is either merely relative to the subject, and is contingent and subjective, or is given unconditionally, and is necessary or objective. The union of presentations in a consciousness is judgment. Thinking, then, is the same as judging, or referring presentations to judgments in general. Hence judgments are either entirely sub-

jective when presentations are solely referred to a consciousness in one subject, and are therein united, or they are objective when they are united in a consciousness in general, that is, are necessarily united therein. The logical momenta of all judgments are so many possible modes of uniting presentations in a consciousness. But if they serve as conceptions, they are conceptions of the *necessary* union of the same in a consciousness, and therefore principles of objectively valid judgments. This union in a consciousness is either analytic by identity, or synthetic by the combination and addition of different presentations to one another. Experience consists in the synthetic connection of phenomena (perceptions) in a consciousness, in so far as this is necessary. Hence pure conceptions of the understanding are those under which all perceptions must be previously subsumed, before they can serve as judgments of experience, in which the synthetic unity of perceptions is presented as necessary and universal.[1]

§ 23.

Judgments, considered merely as the union of given presentations in a consciousness, are rules. These rules, in so far as they present the union as necessary, are rules *à priori*, and in so far as there are none beyond them from which they can be derived, they are axioms. Since, then, in respect of the possibility of all experience, when viewed as the mere form of thought, there are no conditions of the judgments of experience beyond those

[1] But how does this proposition, that judgments of experience must contain necessity in the synthesis of perception, agree with the proposition above so much insisted upon, that experience as knowledge *à posteriori* can simply give contingent judgments? When I say experience teaches me something, I always mean the perception that lies in it, e.g., that heat invariably follows on the illumination of the stone by the sun, and the proposition of experience is so far always contingent. That this heating necessarily results from the illumination by the sun is indeed contained in the judgment of experience (by means of the conception of cause); yet I do not learn this from experience, but the reverse, experience being in the first instance generated by this addition of the conception of the understanding (that of cause) to the perception. As to how the perception came by this addition, the Critique may be consulted in the division respecting the transcendental faculty of judgment.

which bring the phenomena in the various forms of their intuition under the pure conceptions of the understanding which make the empirical judgment objectively valid, these must be the *à priori* axioms of all possible experience.

The axioms of possible experience are at the same time the universal laws of Nature as known *à priori*. And thus the problem contained in our present second question—*How is pure natural science possible?* is solved. For the systematic character required by the form of a science is met with here in completeness, since beyond the above-named formal conditions of all judgments in general, that is, of all the general rules to be found in logic, there are none possible, and these constitute a logical system; while the conceptions founded upon them, containing the conditions *à priori* of all synthetic and necessary judgments, [constitute] in the same way a transcendental system, and finally the axioms, by means of which all phenomena are subsumed under these conceptions, [constitute] a physiological[1] system, i.e., a system of nature, preceding all empirical knowledge of nature, rendering this in the first place possible, and therefore to be properly termed the universal and pure natural science.

§ 24.

The first[2] of the above physiological axioms subsumes all phenomena, as intuitions in space and time, under the conception of *quantity*, and is so far a principle of the application of mathematics to experience. The second subsumes the properly empirical, namely, the feeling, which denotes the reality of intuitions, not precisely under the conception of *quantity*, because feeling is no intuition, contained in space and time, although it places its corresponding object in both. But between reality (presentation of feeling) and zero, i.e., the complete emptiness of intuition in time, there is a difference which has a quantity. For between each given degree of light

[1] Or, as we should now term it. *physical*.—Tr.

[2] The three following paragraphs will hardly be able to be understood without referring to what the Critique says on the axioms, but it may be useful to have a general view of them, and to fix the attention upon the main points.

and darkness, between each degree of heat, and complete coldness, each degree of weight and of absolute lightness, each degree of the containing of space and of totally empty space, progressively smaller degrees can be thought of, and similarly between consciousness and complete unconsciousness (psychological darkness) continually smaller [degrees] exist. Hence no perception is possible that would prove an absolute void; for instance, no psychological darkness that could be viewed otherwise than as a consciousness, which is but surpassed by another stronger consciousness, and the same in all cases of feeling. In this way the understanding can even anticipate feelings which constitute the proper quality of empirical presentations (phenomena), by means of the axiom that they all (that is, the real of every phenomenon) have a degree, and this is the second application of mathematics (*mathesis intensorum*) to natural science.

§ 25.

As regards the relation of phenomena, and indeed simply as to their existence, the determination of this relation is not mathematic but dynamic, and can never be valid objectively, and therefore adequate to an experience, if it be not subordinated to principles *à priori* rendering the cognition of experience regarding them in the first place possible. Hence phenomena must be subsumed under the conception of substance, which lies at the foundation of all determination of existence as a conception of the thing itself; or secondly, in so far as a succession, that is, an event, is met with among the phenomena, under the conception of an effect in reference to cause; or in so far as co-existence is to be cognised objectively, that is, through a judgment of experience, under the conception of community (reciprocal action); and these principles *à priori* lie at the foundation of objectively valid although empirical judgments, that is, the possibility of experience in so far as it is to connect the existence of objects in Nature. These principles are the particular laws of Nature, which may be termed dynamic.

There belongs, finally, to the judgments of experience

the cognition of the agreement and connection, not so much of phenomena among one another in experience, as of their relation to experience generally, which unites either their agreement with the formal conditions cognised by the understanding or their coherence with the material of sense and of perception, or both, in one conception, and consequently contains possibility, reality and necessity, according to universal natural laws, thereby constituting the physiological doctrine of method, the distinction between truth and hypotheses, and the limits of the reliability of the latter.

§ 26.

Although the third table of the principles drawn from the nature of the understanding on the critical method, shows a completeness in itself, which raises it far above every other that has been vainly attempted or may be attempted in the future [to be drawn] from the nature of the thing itself, in a dogmatic way, inasmuch as therein all synthetic axioms *à priori* have been produced in accordance with a principle, that is, the possibility of judgment in general, which constitutes the essence of experience, in reference to the understanding, in such a manner that one may be certain there are no more such axioms (a satisfaction never to be obtained from the dogmatic method), yet this is by far not its greatest service.

Attention must be paid to the ground of proof, which discovers the possibility of this knowledge *à priori*, and limits at the same time all such axioms by a condition, that must never be overlooked, if they are not to be misunderstood, and extended farther in use than the original sense attached to them by the understanding will admit of: namely, that they only contain the conditions of possible experience in general, in so far as it is subordinated to laws *a priori*. Thus I do not say that *things in themselves* contain a quantity, their reality, a degree, their existence, connection of accidents in a substance, &c.; for this no one can prove, because such a synthetic connection is simply impossible out of mere conceptions, where all

reference to sensuous intuition on the one hand, and all connection of the same in a possible experience on the other, is wanting. The essential limitation of conceptions in these axioms is, therefore, that all things only stand under the above-mentioned conditions *à priori* as *objects of experience.*

From this there follows, in the second place, a special and peculiar mode of proof of the foregoing: that the axioms in question do not refer directly to phenomena and their relation, but to the possibility of experience of which phenomena constitute the matter but not the form, i.e., to objective and universally valid synthetic propositions, wherein judgments of experience are distinguished from mere judgments of perception. This happens in that the phenomena as mere intuitions, taking in a portion of space and time, are subordinated to the conception of quantity, which unites the manifold in the same synthetically in accordance with *à priori* rules; and that in so far as the perception contains feeling as well as intuition, between which and zero, namely, its total disappearance, a progression by diminution always takes place, the real of the phenomena must have a basis, seeing that in itself it takes in no portion of space or time.[1] But this progression towards it [viz., reality] from empty time or space, is only possible in time. Consequently, although feeling as the quality of empirical intuition can never be known *à priori* in respect of that wherein it is specifically distinguished from other feelings, it can nevertheless be distinguished in a possible experience generally, as quantity of perception intensively [distinct] from every

[1] Heat, light, &c., are in a small space (so far as degree is concerned) as great as in a large one. In the same way inward presentations (*Vorstellungen*), as pain or consciousness in general, are not smaller in degree, whether they last a long or a short time; hence quantity is as great here in one point and in one moment as in any time or space, however large. Degrees then are quantities, not as to intuition but as to mere feeling, or [in other words] the quantity of the basis of an intuition can only be estimated as quantity through the relation of 1 to 0, that is, by each one passing by endless mediate degrees to disappearance, or by each one growing from zero through endless momenta of increase to a definite feeling in a given time.

Quantitas qualitatis est gradus.
(The quantity of quality is degree.)

other of the same kind; which means the application of mathematics to Nature in respect of the sensuous intuition, by which the former is given us, and by which it becomes in the first place possible and definite.

But the reader must give the greatest attention to the mode of proof of the principles coming under the name of analogies of experience. For inasmuch as these do not, like the principles of the application of mathematics to natural science generally, concern the generation of intuitions, but the connection of their existence in an experience, this can be nothing but the determination of existence in time according to necessary laws, under which alone they are objectively valid, and therefore experience. Thus the proof of synthetic unity does not turn on the connection of things in themselves, but of perceptions, and even of these, not in respect of their content but of their determination in time, and of the relation of existence thereto, according to universal laws. These universal laws contain, therefore, the necessity of the determination of existence in time generally (consequently, according to a rule of the understanding, *à priori*) when the empirical determination in the relative time is to be objectively valid, that is, experience. I cannot enter further into the matter here, in Prolegomena, than to recommend the reader who has been long accustomed to regard experience as a mere empirical aggregation of perceptions, and hence does not reflect that it greatly exceeds the sphere of these, that it gives, namely, to empirical judgments, universal validity, and that for this a pure unity of the understanding is necessary to precede *à priori*, [to recommend him] to give attention to this distinction of experience from a mere aggregrate of perceptions, and to judge the manner of proof from this point of view.

§ 27.

It is here the place to raze Hume's doubt from its foundation. He maintained justly that we can in nowise discern through the Reason the possibility of causation, namely, the reference of the existence of one thing to the existence of some other thing posited by the former. I

may add to this, that we can just as little discern the conception of subsistence, i.e., the necessity contained therein, that a subject must lie at the basis of the existence of a thing, and itself be no predicate of any other thing. [I would say even] that we can form no conception of the possibility of such a thing (though we can point out examples of its use in experience). In the same way this incomprehensibility attaches even to the community of things, since it is not discernible how, from the state of one thing, a consequence can be drawn as to the state of some totally different thing, external to it, and *vice versâ;* and how substances of which each has its own separate existence, are necessarily dependent on one another. At the same time, I am far from regarding these conceptions as merely borrowed from experience, and the necessity, that is presented in them, as fictitious and mere illusion, induced in us by long custom. I have, rather, sufficiently shown that both they and the axioms deduced from them, subsist *à priori* before all experience, and possess indubitable objective correctness, though unquestionably only in respect of experiences.

§ 28.

Although I cannot have the slightest notion of such a connection of things in themselves as of their existing as substances, working as causes, or being able to stand in community with other [substances] as parts of a real whole, I can still less conceive such properties in phenomena *as* phenomena, because these conceptions contain nothing that lies in the phenomena, but something the understanding alone can conceive. We have, then, from such a connection of presentations in our understanding, and, indeed, in judgments generally, a similar conception, namely, that presentations cohere in one kind of judgments, as subject with reference to predicate, in another as cause with reference to effect, in a third as parts together making up a complete possible cognition. Further, we cognise *à priori*, that without the presentation of an object, in respect of one or the other of these momenta, to be considered as something definite, we could have no cognition that could be valid of objects, and if we occupied ourselves

with the object in itself, there would be no single mark possible, by which I could cognise whether it was determined in respect of one or of another cogitated moment, i.e., whether it cohered under the conception of substance, or of cause, or (in relation to other substances) of community, for of the possibility of such a connection of existence I should have no conception. But it is not the question, how things in themselves, but how cognition of experience of things in respect of cogitated momenta of judgments generally, is defined, that is, how things as objects of experience can and should be subsumed under the above conceptions of the understanding. And hence it is clear, that I fully recognise not only the possibility, but also the necessity, of subsuming all phenomena under these conceptions, namely, of using them as axioms of the possibility of experience.

§ 29.

Let us now attempt a solution of Hume's problematical conception (his *crux metaphysicorum*), namely, the conception of Cause. Firstly, there is given me, *à priori*, by means of Logic, the form of a conditioned judgment generally, one cognition as antecedent and another as consequent. But it is possible that in the perception, a rule of the relation may be met with, which will say, that on [the occurrence of a] given phenomenon another always follows (though not conversely), and this would be a case in which to make use of the hypothetical judgment, and to say, for instance, if a body be illumined long enough by the sun, it will become warm. There is certainly no necessity of connection here, in other words, no conception of cause. But I continue: if the above proposition, which is a mere subjective connection of perception, is to be a proposition of experience, it must be regarded as necessary and universally valid; but such a proposition would run: Sun is through its light the cause of heat. The above empirical rule is now looked upon as law, and indeed, not alone as valid of phenomena, but valid of them in relation to a possible experience, which requires thoroughly, and therefore necessarily, valid rules. I perfectly understand, then, the conception of Cause, as a

conception necessarily belonging to the mere form of experience, and its possibility as a synthetic union of perceptions, in a consciousness in general; but the possibility of a thing in general as a cause I do not understand, because the conception of cause does not refer at all to things, but only indicates the condition attaching to experience, namely, that this can be only an objectively valid knowledge of phenomena, and their sequence in time, in so far as the antecedent can be united to the consequent according to the rule of hypothetical judgments.

§ 30.

Hence the pure conceptions of the understanding have no meaning whatever, when they quit the objects of experience and refer to things in themselves (*noumena*). They serve, as it were, to spell out phenomena, that these may be able to be read as experience. The axioms arising from their relation to the world of sense, only serve our understanding for use in experience. Beyond this, are only arbitrary combinations, destitute of objective reality, and the possibility of which can neither be known *à priori*, nor their reference to objects be confirmed, or even made intelligible by an example, because all examples are borrowed from some possible experience, and consequently the objects of those conceptions are nothing but what may be met with in a possible experience.

This complete solution of Hume's problem, although it turns out to be contrary to the opinion of its originator, preserves for the pure conceptions of the understanding their origin *à priori*, and for the universal laws of Nature their validity as laws of the understanding, but in such a manner that their use is limited to experience, because their possibility has its basis, solely, in the reference of the understanding to experience; not because they are derived from experience, but because experience is derived from them, which completely reversed mode of connection never occurred to Hume.

The following result of all previous researches follows from the above investigations: "All synthetic axioms *à priori* are nothing more than principles of possible ex-

perience," and can never be referred to things in themselves, but only to phenomena as objects of experience. Hence pure mathematics no less than pure natural science can never refer to anything more than mere phenomena, and only present that which either makes experience in general possible, or which, inasmuch as it is derived from these principles, must always be able to be presented in some possible experience.

§ 31.

And thus we have at last something definite to hold by in all metaphysical undertakings, which hitherto, bold enough, but always blind, have pursued all things without distinction. Dogmatic thinkers have never let it occur to them, that the goal of their endeavours should be extended such a short way from them, and even those most confident in their imagined common sense have started with conceptions and principles of the mere Reason, legitimate and natural, it is true, but intended merely for use in experience, [in search of] spheres of knowledge, for which they neither knew nor could know of any definite boundaries, because they had neither reflected nor could reflect on the nature or even the possibility of any such pure understanding.

Many a naturalist of the pure Reason (by which I understand he who ventures to decide in questions of metaphysics, without any science) might well profess that what has been here put forward with so much preparation, or if he will have it so, with tediously pedantic pomp, he has long ago not merely conjectured but known and penetrated, by the prophetic spirit of his common sense, namely, "that with all our Reason, we can never pass beyond the field of experiences." But he must confess, notwithstanding, when questioned *seriatim* as to his principles of Reason, that amongst these there are many to be found not drawn from experience, and therefore valid, independently thereof, and *à priori*. How then, and on what grounds, will he hold the dogmatist and himself in limits, who use these conceptions and principles outside all possible experience, simply because they are recognised as independent of it? And even this adept of common sense,

in spite of all his pretended, cheaply acquired, wisdom, is not proof against wandering, unobserved, beyond the objects of experience into the field of chimeras. He is, indeed, in the ordinary way, deeply enough involved therein, although by the use of popular language, by putting everything forward as probability, reasonable supposition or analogy, he gives some colour to his groundless assumptions.

§ 32.

From the earliest ages of philosophy, investigators of the pure Reason have postulated, beyond the sensible essences (*phenomena*) which constitute the world of sense, special essences of the understanding (*noumena*) which are supposed to constitute a world of understanding; and since they held appearance and illusion [*Erscheinung und Schein*] for the same thing, which in an undeveloped epoch is to be excused, ascribed reality to the intelligible essence alone.

In fact, when we regard the objects of sense, as is correct, as mere appearances, we thereby at the same time confess that a thing in itself lies at their foundation, although we do not know it, as it is constituted in itself, but only its appearance, that is, the manner in which our senses are affected by this unknown something. The understanding then, by accepting appearances, admits also the existence of things in themselves, and we may even say that the presentation of such essences as lie at the basis of appearances, in short, mere essences of the understanding, is not only admissible, but unavoidable.

Our critical deduction does not by any means exclude such things (*noumena*), but rather limits the principles of æsthetic, in so far that these should not be extended to all things, whereby everything would be changed into mere appearance, but that they should only be valid of objects of a possible experience. Essences of the understanding are hereby admitted only by the emphasising of this rule, which admits of no exception, that we know nothing definite whatever of these pure essences of the understanding, neither can we know anything of them, because our pure conceptions of the understanding no less

than our pure intuitions, concern nothing but objects of a possible experience, in short, mere essences of sense, and as soon as we leave these, the above conceptions have not the least significance remaining.

§ 33.

There is indeed something seductive about our pure conceptions of the understanding, as regards temptation to a transcendent use; for so I name that which transcends all possible experience. Not only do our conceptions of substance, force, action, reality, &c., which are entirely independent of experience containing no phenomenon of sense, really seem to concern things in themselves (*noumena*); but what strengthens this supposition is, that they contain a necessity of determination in themselves, to which experience can never approach. The conception of cause contains a rule, according to which from one state another follows in a necessary manner; but experience only teaches us that often, or at most usually, one state of a thing follows upon another, and can therefore acquire neither strict universality nor necessity.

Hence these conceptions of the understanding seem to have far too much significance and content for mere use in experience to exhaust their entire determination, and the understanding builds in consequence, unobserved, by the side of the house of experience, a much more imposing wing, which it fills with sheer essences of thought, without even noticing that it has overstepped the legitimate bounds of its otherwise correct conceptions.

§ 34.

There were two important, and indeed altogether indispensable, although exceedingly dry investigations necessary, that have been undertaken in the Critique (p. 107), in the first of which it was shown that the senses do not furnish the pure conceptions of the understanding *in concreto*, but only the *schema* for their use, and that the object which conforms to it is only to be met with in experience as the [common] product of the under-

standing, and the materials of sense. In the second investigation (Critique, p. 178) it is shown, that—notwithstanding the independence of our pure conceptions of the understanding and principles of experience, even to the apparently greater range of their use—nothing whatever could be conceived through them outside the field of experience, because they can do nothing but determine the merely logical form of judgment in respect of given intuitions. But since, beyond the field of sensibility, no intuition is given, these pure conceptions become totally void of meaning, inasmuch as they can in no way be presented *in concreto*. Consequently, all these *noumena* together with their sum-total, an intelligible world,[1] are nothing but presentations of a problem, the subject of which in itself is indeed possible, but the solution of which is, by the nature of our understanding, utterly impossible, since our understanding is no faculty of intuition, but is merely the connection of given intuitions in an experience, and must comprise therefore all objects for our conceptions; but apart from these, all conceptions which cannot be supported by an intuition, must be without meaning.

§ 35.

The imagination may perhaps be forgiven, if it sometimes dreams, and fails to keep itself carefully within the limits of experience; for certainly it is invigorated and strengthened by a free flight like this, and it is always easier to moderate its boldness than to stimulate its languor. But for the understanding, which ought to think, to dream instead, can never be forgiven, as it is our only support in setting bounds to the fantasies of the imagination, where this is necessary.

[1] Not, as it is commonly expressed, *Intellectual* world; for cognitions, through the understanding, are *intellectual*, and these refer only to our world of sense; but objects are called *intelligible*, so far as they can be presented through the understanding, and to which none of our sensuous intuitions can have reference. But as every object must require some possible intuition, one would have to conceive an understanding that contemplated things immediately, but of such we have not the least conception, and just as little therefore of the essence *of the understanding*, to which it should have reference.

It begins, however, very innocently and modestly. First of all, it reduces the elementary cognitions inhering in it before all experience, but having their application, notwithstanding, in experience, to their pure state. Gradually it lets fall these limits; and what is there then to hinder it, seeing that the understanding has taken its principles quite freely from itself? First of all, it is led to newly invented powers in Nature, soon after to essences outside Nature, in a word, to a world for whose fitting-up we can never fail in material, because by a fruitful imagination this will always be richly procured, and although not substantiated by experience, will yet never be confuted by it. This is the reason why young thinkers are so fond of metaphysics, treated in a genuinely dogmatic manner, and sacrifice to it their time and talents which might be otherwise useful.

But it is of no avail attempting to moderate these fruitless attempts of the pure Reason, by all manner of cautions as to the difficulty of the solution of such deeply-hidden questions, lamentations over the limits of our Reason, and by lowering assertions to mere conjectures. For if their *impossibility* be not clearly shown, and the *self-knowledge* of the Reason be not [raised to] a true science, in which the field of its right use is separated from that of its nugatory and fruitless use, so to speak, with geometrical certainty, these vain endeavours will never be completely laid aside.

§ 36.

HOW IS NATURE ITSELF POSSIBLE?

This question, which is the highest point the transcendental philosophy can ever touch, and to which it must also, as its boundary and completion, be directed, properly comprises two questions.

Firstly: How is Nature, in its material signification, namely, as intuition, as the sum-total of phenomena—how is space, time, and that which fills them both, namely, the object of feeling in general—possible? The answer is, by means of the construction of our sensibility, in ac-

cordance with which, it is affected in a special manner by objects, in themselves unknown and entirely distinct from these appearances. This answer has been given in the book itself in the Transcendental Æsthetic, but in these Prolegomena in the solution of the first general question.

Secondly: How is Nature in its *formal* signification—as the sum-total of the rules to which all phenomena must be subordinated, if they are to be thought of as connected in an experience—possible? The answer cannot but be: It is only possible by means of the construction of our understanding, in accordance with which all the above presentations of sensibility are necessarily referred to a consciousness, and whereby the special manner of our thought (namely, by rules), and by means of these, experience (which is to be wholly distinguished from a knowledge of things in themselves) is possible. This answer has been given in the book itself in the Transcendental Logic, but in these Prolegomena in the course of the solution of the second general question.

But how this special property of our sensibility itself, or of our understanding together with the necessary apperception lying at its basis, and at that of all thought, is possible, will not admit of any further solution or answer, because we invariably require it for all answers and for all thought of objects.

There are many laws of Nature that we can only know by means of experience, but regularity in the connection of phenomena, i.e., Nature in general, we can never learn through experience, because experience itself requires such laws, and these lie at the foundation of its possibility *à priori*. The possibility of experience in general is at once the universal law of Nature, and the axioms of the one are at the same time the laws of the other. For we know nothing of Nature otherwise than as the sum-total of phenomena, namely, of presentations in us, and hence can derive the law of their connection in no other way than from the principles of the same connection in ourselves; in other words, from the conditions of necessary union in a consciousness, which constitutes the possibility of experience.

Even the main proposition, worked out through the whole of this section, that universal natural laws are to

be known *à priori*, of itself leads to the further proposition, that the highest legislation of Nature must lie in ourselves, namely, in our understanding, and that we must seek its universal laws, not in Nature, by means of experience; but conversely, must seek Nature, as to its universal regularity, solely in the conditions of the possibility of experience lying in our sensibility and understanding. For how would it otherwise be possible to know these laws *à priori* if they be not rules of analytic knowledge, but actually synthetic extensions of the same? Such a necessary agreement of the principles of possible experience with the laws of the possibility of Nature can only occur from one of two causes; either the laws are borrowed from Nature by means of experience, or conversely, Nature is derived from the laws of the possibility of experience generally, and is entirely the same thing as the purely formal regularity of the latter. The first supposition contradicts itself, for the universal laws of Nature can and must be known *à priori* (i.e., independently of all experience), and be posited as the basis of the empirical use of the understanding; so that only the second [hypothesis] remains to us.[1]

But we must distinguish the empirical laws of Nature, which always presuppose particular perceptions, from the pure or universal natural laws, which without any particular perceptions at their foundation, merely contain the conditions of their necessary union in an experience; and in respect of the last, Nature and possible experience are the same thing. Hence, as in this, the legitimacy rests on the necessary connection of phenomena in an experience, in other words, on the original laws of the understanding (without which we could cognise no object of the sensuous world whatever), it sounds at first singular, but is none the less certain, when I say in respect of the latter: *The*

[1] Crusius alone thought of a compromise, namely, that a spirit who cannot err nor deceive may have implanted those natural laws in us originally; but, since deceptive principles often intrude themselves, of which the system of this man itself shows not a few examples, it looks dubious as to the use of such principles, owing to the want of certain criteria to distinguish those of genuine from those of ungenuine origin, for we can never know for certain what the Spirit of truth or the Father of lies may have instilled into us.

understanding draws its laws (à priori) not from Nature, but prescribes them to it.

§ 37.

We will illustrate this apparently daring proposition by an instance, showing that laws, which we discover in objects of sensuous intuition, especially when they are cognised as necessary, are held by ourselves to be such as the understanding has placed them, although in all other respects they may resemble the natural laws we attribute to experience.

§ 38.

If we consider the properties of the circle, by which the figure unites in itself so many arbitrary determinations of space, in a universal rule, one cannot do otherwise than attribute a nature to this geometrical thing. Two lines, for instance, which intersect one another and the circle, it matters not how they may be drawn, are yet always so regular that the rectangle under the segments of the one line is equal to that under the segments of the other. Now I ask, "Does this law lie in the circle or in the understanding?" in other words, does this figure contain independently of the understanding the ground of this law in itself, or does the understanding impose the law that chords cut one another in geometrical proportion, upon it, inasmuch as it has itself constructed the figure according to its own conceptions, namely, the equality of radii? We soon perceive when we follow the proofs of this law, that it can only be derived from the condition the understanding places at the foundation of the construction of this figure, namely, the equality of radii. If we extend the conception, in order to pursue still farther the unity of the manifold properties of geometrical figure under common laws, and consider the circle as a conic section, subordinated to the same fundamental conditions of construction as other conic sections, we find that all chords that intersect within the ellipse (parabola and hyperbola) always intersect, so that the rectangles under their segments, though not indeed equal, yet stand in the same ratio to one another. If we proceed still farther,

namely, to the fundamental doctrines of physical astronomy, a physical law of mutual attraction is seen extended over the whole of material nature, whose rule is, that it decreases inversely as the square of the distance from each attracting point, that is, as the spherical surfaces, in which this power diffuses itself, increase; and this seems to lie necessarily in the nature of things themselves, and therefore is usually enunciated as cognisable *à priori*. However simple the sources of this law may be, as they rest merely on the relations of spherical surfaces of different radii, the consequences are so valuable, as regards the manifold nature of its agreement and regularity, that not only all possible orbits of the heavenly bodies [are described] in conic sections, but such a relation of them among one another follows, that no law of attraction could be conceived as suitable for a world-system, other than that of the inverse square of the distance.

Here then is Nature resting on laws which the understanding cognises *à priori*, and indeed mainly on universal principles of the determination of space. Now I ask: Do these natural laws lie in space, and does the understanding learn them by merely seeking to investigate the abundant meaning contained therein, or do they lie in the understanding and in the manner in which this determines space according to the conditions of synthetic unity, on which all these conceptions hinge? Space is something so uniform, and as regards all particular properties so indefinite, that certainly no one will seek for any wealth of natural laws in it. On the other hand that which determines space to the circular form, to the figure of the cone or of the sphere, is the understanding in so far as it contains the ground of the unity of its construction. The mere universal form of intuition called space, is the substratum of all particular objects of definable intuitions, and in this certainly lies the condition of its possibility and variety. But the unity of objects is determined simply by the understanding, according to conditions that lie in its own nature, and the understanding is thus the source of the universal order of Nature, since it comprehends all phenomena under its own laws; and thereby it first constructs experience (according to its

form) *à priori*, by means of which all that is to be known through experience becomes necessarily subordinated to its laws. For we have nothing to do with the nature of *things in themselves*, which is as independent of the conditions of our sensibility as of those of the understanding, but with Nature as the object of a possible experience; and the understanding, while making this possible, [insists] that the world of sense be either no object of experience at all, or else, a Nature.

§ 39.

APPENDIX TO PURE NATURAL SCIENCE.

OF THE SYSTEM OF THE CATEGORIES.

There can be nothing more desired by a philosopher than that the variety of conceptions or principles he had previously had presented to him in a scattered manner through the use he had made of them *in concreto*, should be deduced from one principle *à priori*, and should be all united in this manner in one cognition. Formerly he only believed that those things which remained over, after a certain abstraction, and which by comparison with one another seemed to constitute a particular kind of cognitions, were completely collected; but this was only an *aggregate*. Now he knows that exactly so many, neither more nor less, can constitute the mode of cognition, and sees the necessity of their division, which is a comprehension; and thus, for the first time, he has a system.

To search out conceptions from common cognitions, having no particular experience at their bases, and at the same time occurring in all cognition of experience, of which they constitute, as it were, the mere form of connection, presupposes no greater reflection or more insight than to search out in a language rules for the real use of words in general, and thus to get together the elements of a grammar. Indeed, both investigations are very nearly related, even if we are unable to give a reason why each language has precisely this and no other formal construction, and still less why exactly so many, neither

more nor less, of such formal determinations of the same, generally, are to be found.

Aristotle collected ten such pure elementary cognitions under the name of categories.[1] To these, which were also called predicaments, he saw himself, subsequently, obliged to add five post-predicaments,[2] which yet lay partly in the former (as *prius*, *simul*, *motus*); but this rhapsody could but serve, and be admired, as a hint for future investigators, rather than be valid as a regularly developed idea; hence in more advanced [stages] of philosophy it has been rejected as altogether useless. On investigation of the pure elements (containing nothing empirical) of the human cognition, I first succeeded, after long reflection, in distinguishing and separating with confidence the elementary conceptions of sensibility (space and time) from those of the understanding, Under these circumstances, the 7th, 8th, and 9th categories were excluded from the list. The remainder could be of no use to me, because there was no principle at hand by which the understanding could be fully gauged, and all its functions, from which its pure conceptions arise, be defined completely and with precision.

In order to find out such a principle, I looked about me for an act of the understanding containing all the rest, and distinguishing itself, only through different modifications or momenta, in bringing the manifold of presentation under the unity of thought generally, and I then found this act of the understanding to consist in judgment. There lay already before me the entire, although not altogether faultless, work of the logicians, whereby I was placed in a position to present a complete table of the pure functions of the understanding that were indefinite as regards the whole object-world. I finally referred these functions of judgment to objects generally, or rather to the conditions determining judgments as objectively valid, and there

[1] 1, *Substantia*; 2, *Qualitas*; 3, *Quantitas*; 4, *Relatio*; 5, *Actio*; 6, *Passio*; 7, *Quando*; 8, *Ubi*; 9, *Situs*; 10, *Habitus*. (Substance; Property; Quantity; Relation; Action; Passion; When; Where; Position; State.)

[2] *Oppositum*; *Prius*; *Simul*; *Motus*; *Habere*. (Opposition; Priority; Simultaneity; Motion; Possession.

arose pure conceptions of the understanding, respecting which I could be without doubt that they alone, and only so many of them, neither more nor less, could constitute our whole cognition of things from mere understanding. I called them, as was suitable, by their old name of *categories*; in doing which, however, I reserved to myself the right to add in their entirety, under the name of *predicables*, all conceptions to be derived from these—whether by connection with one another, or with the pure form of the phenomenon (space and time), or with their matter so far as it is not empirically determined (object of feeling, generally), as soon as a system of transcendental philosophy, in furtherance of which I was now occupied with a Critique of the Reason itself, should be constructed.

But that which is essential in this system of categories, and distinguishes it from the old rhapsody which proceeded without any principle, and that which alone entitles it to be counted as philosophy, consists in that by its means the true significance of the pure conceptions of the understanding and the conditions of their use can be clearly defined. For it is evident that they are only logical functions in themselves, but as such do not constitute the least conception of an object in itself, but require sensuous intuition at their foundation. And hence they serve only to determine in respect of the same empirical judgments that are otherwise undetermined and indifferent as regards all functions of judgment; to procure for them thereby universality, and by means of them to make *judgments of experience* generally, possible.

Such an insight into the nature of the categories, at the same time limiting them to use in experience, never occurred either to their first originator or to any one after him. But without this insight (which exactly depends on their derivation or deduction) they are quite purposeless, and a miserable list of names without explanation or rule of use. Had anything of the kind ever entered into the minds of the ancients, without doubt the whole study of the cognition of the pure Reason, which under the name of metaphysics has through long centuries ruined many a good head, would have come down to us in quite a different form, and would have enlightened the human understanding

instead of, as has actually happened, [causing it] to exhaust itself in obscure and vain subtleties, and making it unfruitful for true science.

This system of categories makes all treatment of any object of the pure Reason itself systematic, and affords an indubitable direction or clue how and to what point in the investigation every metaphysical consideration, if it is to be complete, must be reduced; for it exhausts all the momenta of the understanding, under which every other principle must be brought. It is thus that the table of conception has arisen, of whose completeness we can only be assured by means of the system of categories.[1] And even in the division of these conceptions destined to transcend the physiological use of the understanding (Critique, pp. 207 and 257), it is always the same clue, which, because it must be always carried through the same fixed points, determined *à priori* in the human understanding, invariably forms a closed circle, leaving no doubt remaining that the object of a pure conception of the understanding or of the Reason, in so far as it is to be weighed philosophically and according to principles *à priori*, can be completely known in such a manner. I have not been able even to omit from this derivation, to make use of the

[1] On the table of the categories many ingenious observations may be made; as (1) that the third arises from the combination in one conception of the first and second; (2) that those of quantity and quality are merely a progression from unity to totality, or from something to nothing (for which purpose the categories of quality must stand thus: reality, limitation, complete negation) without *correlata* or *oppositа*; while, on the other hand, those of relation and modality carry the latter with them; (3) that, as in logic, categorical judgments lie at the foundation of all others, so the category of substance does to all conceptions of real things; (4) that, as modality is no particular predicate in judgments, so also modal conceptions add no determination to things, &c. Such considerations are very useful. If, in addition, all the predicables are counted up, that can be drawn pretty completely from any good Ontology (e.g., Baumgarten's), and are arranged in classes under the categories—whereby we must not omit, however, to add as complete a dissection of all these conceptions as possible—a purely analytic part of metaphysics will arise, containing, not a single synthetic proposition, which might precede the second (the synthetic), and by its definiteness and completeness be not only useful, but by virtue of its symmetrical character contain a certain beauty.

most abstract of ontological divisions, namely, the manifold distinction of *conceptions of something and nothing*, and accordingly to construct a regular and necessary table (Critique, p. 207).

This system, like every true system based on a universal principle, shows its inestimable utility, in that all foreign conceptions, which might otherwise creep in between the above pure conceptions of the understanding, are excluded, and its place given to every cognition. Those conceptions which under the name of *conceptions of reflection*, I had reduced to a table, on the clue of the categories, mingle themselves, in an ontology without favour or just claim, under the pure conceptions of the understanding, although the latter are conceptions of the connection [of the object] and thereby of the object itself; but the former are the mere comparison of previously given conceptions, and have therefore an altogether different nature and use: by my legitimate division [1] they are saved from this confusion. But the utility of the above separate table of the categories will be seen much more clearly, when, as we are now about to do, we separate the table of the transcendental conceptions of the Reason which are of quite a different nature and origin from the former conceptions of the understanding, and must consequently have a form other than the latter. This necessary separation has never yet taken place in any system of metaphysics, where ideas of the Reason and conceptions of the understanding intermingle, without distinction, as though they were members of one family—a state of confusion which in the absence of a special system of categories could never be avoided.

[1] Critique, p. 190 *et seq.*

THE THIRD PART OF THE MAIN TRANSCENDENTAL PROBLEM.

How is Metaphysics possible at all?

§ 40.

Pure mathematics and pure natural science would not require *for their own security* and certainty a deduction such as we have just concluded with respect to them both; for the former rests upon its own evidence, while the latter, although arising from the pure sources of the understanding, is dependent upon the complete substantiation of experience, a witness it is unable altogether to repudiate and do without, seeing that with all its certainty, as philosophy, it can never compete with mathematics. Both these sciences required the foregoing investigation, not for their own sake, but for the sake of another science, namely, metaphysics.

Metaphysics is concerned not merely with natural conceptions, having invariably an application in experience, but, in addition to these, with pure conceptions of the Reason, which can never be given in any possible experience; that is, with conceptions whose objective reality (as distinguished from simple cobwebs of the brain), and with assumptions whose truth or falsity can be confirmed or discovered by no experience. This part of metaphysics is precisely that which constitutes its essential purpose, all else being merely a means thereto, and hence this science requires such a deduction *for its own sake.* The third problem, now before us, concerns, as it were, the essence and speciality of metaphysics, namely, the occupation of the Reason with itself alone, inasmuch as it broods over its own conceptions and the knowledge of objects supposed to arise immediately from them, without having need of the mediation of experience, or indeed without the possibility of being able to attain thereto by its means.[1]

[1] If it be said that a science is at least *real* in the idea of all men when it is constituted; that the problems leading to it are put forward by the nature of the human reason in all men, and con-

Without a satisfactory solution of this problem, Reason can never be just to itself. The empirical use to which the Reason limits the understanding, does not exhaust its own function. Each special experience is but a portion of the whole sphere of its domain. But the *absolute totality of all possible experience*, though in itself no experience, constitutes nevertheless for the Reason a necessary problem, to the mere presentation of which it demands quite different conceptions from the pure conceptions of the understanding, the use of which is only *immanent*, i.e., referable to experience, so far as it can be given; whereas the conceptions of the Reason extend to the completeness, i.e., the collective unity of all possible experience, thereby passing beyond any given experience and becoming *transcendent*.

As, then, the understanding required the Categories for experience, so the Reason contains in itself the ground of Ideas, by which I understand necessary conceptions the subject of which *cannot* be given in any experience. The latter are as inherent in the nature of the Reason as the former in the nature of the Understanding, and if they carry with them an illusion that may easily mislead, this illusion is unavoidable, although we may very well guard ourselves from being misled by it.

As all illusion consists in the subjective ground of judgment being taken for objective, the self-knowledge of the pure Reason, in its transcendent (exaggerated) use, is the only preservative against the aberrations into which the Reason falls when it misapplies its function, and refers its transcendent character, concerning only its own subject and its direction in all immanent uses, to the object itself.

§ 41.

The distinction between the ideas, or pure conceptions of the Reason, and the categories or pure conceptions of the understanding as being cognitions of quite another order, origin, and use, is so important a point in the

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sequently that many, if faulty, attempts at its solution are at all times unavoidable, we must then say, metaphysics is subjectively (and necessarily) real, and hence we ask with justice, How is it (objectively) possible?

foundation of a science, destined to contain the system of all these cognitions *à priori*, that without a division of this kind metaphysics would be simply impossible, or at best an incoherent, clumsy attempt at building a house of cards, without a knowledge of the materials handled, and of their capacity for this or that purpose. If the Critique of the Pure Reason had only accomplished the direction of attention to the distinction for the first time, it would have thereby contributed more to the explanation of our conceptions and to the guidance of investigation in the field of metaphysics, than all the fruitless endeavours at solving the transcendental problems of the pure Reason that have ever been undertaken, in which the suspicion has never occurred that the field was quite other than that of the pure understanding, and where consequently the conceptions of the understanding and the Reason have been classed together as though they were of the same kind.

§ 42.

All pure cognitions of the understanding have the peculiarity that their conceptions are given in experience, and their axioms can be confirmed by experience; whereas the transcendent cognitions of the Reason are neither given as concerns their *ideas* in experience, nor can their *axioms* be confirmed or refuted by experience. Hence the error possibly arising can be detected by nothing else but pure Reason itself, and this is very difficult, because the Reason by means of its ideas is naturally dialectic, and this unavoidable illusion can be held in check by no objective and dogmatic investigations of the matter, but solely by the subjectivity of the Reason itself as a source of ideas.

§ 43.

It has always been my greatest aim in the Critique, not alone to distinguish carefully the modes of cognition, but also to derive from their common source all the conceptions pertaining to them severally, so that I should not only be informed whence they come and hence be able to determine their use with certainty, but also that I should have

the altogether unexpected, but priceless, advantage of knowing the numeration, classification, and specification of the conceptions *à priori*, and, therefore, according to principles. Without this, everything in metaphysics is mere rhapsody, in which one never knows whether what one possesses is sufficient, or whether there may not be something wanting in it; and if so, where. We can certainly only have this advantage in pure philosophy, but of this latter it constitutes the essence.

As I had found the origin of the categories in the four logical functions of all judgments of the understanding, it was only natural to seek the origin of the ideas in the three functions of the conclusions of the Reason. For if such pure conceptions of the Reason (transcendental ideas) be once given, they could not, unless they were regarded as innate, be found elsewhere than in the same act of Reason, which, as far as form is concerned, constitutes the logical element of the conclusions of the Reason, but so far as it presents the judgments of the understanding as determined with respect, either to one or the other form *à priori*, [constitutes] the transcendental conceptions of the pure Reason.

The formal distinction of the conclusions of the Reason, renders their division into categorical, hypothetical and disjunctive, necessary. The conceptions of the Reason based thereon, contain, firstly, the idea of the complete subject (substantial); secondly, the idea of the complete series of conditions; thirdly, the determination of all conceptions in the idea of a complete content (*Inbegriff*) of the possible.[1] The first idea is psychological, the second cosmological, and the third theological; and as all three

[1] In disjunctive judgments we consider all *possibility* as divided in relation to a particular conception. The ontological principle of the thorough determination of a thing generally (that of all possible opposite predicates one must attach to each thing), which is at the same time the principle of all disjunctive judgments, is based on the content (*Inbegriff*) of all possibility, in which the possibility of a thing in general is regarded as determined. This serves as a slight explanation of the above proposition, that the act of Reason, in disjunctive conclusions of the Reason, is the same, as regards form, as that whereby it attains to the idea of a content of all reality, embracing in itself the positive of all mutually opposing predicates.

give occasion to a dialectic, each of its own kind, the division of the whole dialectic of the pure Reason founded thereupon, is into the Paralogism, the Antinomy, and finally the Ideal of the same. By this division we are fully assured that all demands of the pure Reason are here presented, in their completeness; that no single one can fail, because the capacity of the Reason itself, as that from which they all take their origin, is thereby completely surveyed.

§ 44.

In this general consideration it is noteworthy, that the ideas of the Reason, unlike the categories, are not of any service whatever in the use of the understanding in experience, but can be wholly dispensed with in this connection; indeed, they are impediments to the maxims of the understanding's knowledge of nature, notwithstanding their necessity for another purpose, yet to be determined. Whether the soul be, or be not, a simple substance, can be quite indifferent to us, so far as the explanation of its phenomena is concerned, for we cannot render the conception of a simple essence comprehensible, sensuously or *in concreto*, by any possible experience; and hence it is quite barren as to the hoped-for insight into the cause of the phenomena; and cannot serve as any principle of explanation for what is afforded, either by internal or external experience. Just as little can the cosmological ideas of the beginning of the world or of the eternity of the world (*a parte ante*) avail us to explain an occurrence in the world itself. Finally, we must, in accordance with a just maxim of the philosophy of Nature, refrain from all explanation of the order of Nature, which is derived from the will of a Supreme Being, because this is no longer a philosophy of Nature, but a confession that we have finished with the latter. Hence these ideas have quite a different determination of their use from the categories, by means of which, and of the principles based upon them, experience itself is first possible. But our laborious analytic of the understanding would be quite superfluous, if our aim were nothing else but mere knowledge of Nature, such as can be given in

experience; for Reason accomplishes its work both in mathematics and natural science, certainly and well, without any of this subtle deduction. Thus our Critique of the understanding combines with the ideas of the pure Reason, in an aim placed beyond the empirical use of the understanding, of which we have above said that, in this respect, it is quite impossible, and destitute alike of object and meaning. But there must, nevertheless, be an agreement between that which belongs to the nature of the Reason and of the understanding, and the former must contribute to the completion of the latter, and cannot possibly confuse it.

The solution of this problem is as follows: the pure Reason has no particular objects denoted by its ideas which lie outside the field of experience in view, but merely requires completeness of the use of the understanding within the system of experience. This completeness, however, can only be a completeness of principles, but not of intuitions and objects. But in order to represent the former definitely, it regards them as the cognition of an object, a cognition completely determined as regards these rules, but the object of which is only an idea, designed to bring the cognition of the understanding as near as possible to the completeness indicated by that idea.

§ 45.

PRELIMINARY OBSERVATION ON THE DIALECTIC OF THE PURE REASON.

We have above (§§ 33, 34) shown, that the purity of the categories, from all admixture of sensuous determinations, may mislead the Reason into extending its use entirely beyond the range of all experience, to things in themselves; for although they can find no intuition that could lend them meaning and sense *in concreto*, yet as mere logical functions they may represent a thing in general, notwithstanding that, independently, they are unable to give a definite conception of anything whatever. Such hyperbolical objects are what are termed *noumena*, or pure essences of the Understanding (better essences of

thought), as, for instance, *substance*, when considered as *without permanence* in time, or a *cause*, which does not *operate in time*, &c., inasmuch as predicates are then attached to them, which serve merely to make the conformability of experience to law possible, and at the same time all the conditions of intuition—under which experience is alone possible—are taken away from them, whereby these conceptions lose all significance. There is, however, no danger of the understanding of itself, unimpressed by laws foreign to it, branching out so rashly into the field of mere essences of thought. But when the Reason, which cannot be completely satisfied with an empirical use of the rules of the understanding, requires the completion of this chain of conditions, the understanding is driven out of its own sphere, partly to present objects of experience in a series extended so far that no experience can grasp it, and partly (in order to complete this series) to search for *noumena*, wholly outside the same, to which it may attach the above chain, and thereby, being at last independent of experience, render its attitude once for all complete. These are the transcendental ideas, which, in accordance with the true but hidden ends of the natural determination of our Reason, are designed not for extravagant conceptions, but merely for the unlimited extension of empirical use; but which, however, by an unavoidable illusion seduce the understanding into a *transcendent* use, that although deceitful, cannot be kept within the bounds of experience by any resolution, but can only be restrained within [due] limits with pains, and by means of scientific instruction.

§ 46.

I. Psychological Idea (Critique, p. 237).

It has long been observed that the subject proper, in all substances, namely, that which remains over after all accidents (as predicates) have been abstracted, that is, the *substantial* itself, is unknown, and oft-repeated complaints have been made of these limitations of our insight. But it is to be observed as regards this, that the human understanding is not to be taken to task for

not knowing the substantial of things, that is, for not being able to determine it by itself, but rather for expecting to know it definitely, like a given object, when it is a mere idea. The pure Reason requires of every predicate of a thing the subject belonging to it, but to this, which is again necessarily only predicate, it requires a further subject, and so on *ad infinitum* (or as far as we can reach). But it follows from the above, that nothing to which we can attain is to be taken for an ultimate subject, and that the substantial itself can never be thought by our understanding, however deeply penetrating it may be, not even if the whole of Nature were unveiled before it; because the specific nature of our understanding consists in that it thinks all things discursively, i.e., through conceptions, and hence solely by means of predicates, to which the absolute subject must always be wanting. For this reason all real qualities whereby we cognise bodies, even to impenetrability, which must always present itself as the effect of a force, are simply accidents, the subject of which eludes us.

Now it seems as though in our own consciousness (the thinking subject) we have this substantial, and indeed in an immediate intuition; for all predicates of the internal sense refer to the *ego*, the subject, and this cannot be thought of as predicate of any other subject whatever. Here, then, the completeness in the connection of the given conceptions as predicates of a subject, not merely an idea, but an existence, namely, the *absolute subject* itself, seem to be given in experience. But this experience is vain, for the *ego* is no conception at all,[1] but merely a designation of the object of the internal sense, so far as we can cognise it by no further predicate, and hence in itself it can indeed be no predicate of another thing, and just as little a definite conception of an absolute subject, but only, as in all other cases, the reference of the

[1] Were the presentation of the apperception, the *ego*, a conception whereby anything whatever was thought, it could also be used as predicate of other things, or it would contain such predicates. It is, really, nothing more than the feeling of a reality without the least conception, but only presentation of that to which all thought stands in relation (*relatione accidentis*).

internal phenomena to their unknown subject. At the same time, this idea (which serves well enough, as regulative principle, completely to annihilate all materialistic explanations of the internal phenomena of our soul) occasions, owing to a perfectly natural misunderstanding, a very plausible argument, by inferring from this supposed cognition of the substantial in our thinking entity, its nature, in so far as the knowledge of the same falls entirely outside the content of experience.

§ 47.

This thinking self (the soul) may however, as the ultimate subject of thought, which cannot be conceived as the predicate of another thing, be called substance; but this conception remains wholly barren, and void of all results, if permanence, which makes the conception of substances in experience fruitful, cannot be proved of it.

But permanence can never be proved from the conception of a substance, as a thing in itself, but only for the purposes of experience. The above has been fully explained in the first analogy of experience (Critique, p. 136), and, if this demonstration be not accepted, the attempt need only be made as to whether it is possible to prove, from the conception of a subject, not existing as the predicate of some other thing, that its existence is thoroughly permanent, and that neither in itself, nor through any natural cause, can it arise or pass away. Such synthetic propositions *à priori* can never be proved in themselves, but only with reference to things as objects of possible experience.

§ 48.

When from the conception of the soul as substance we infer its permanence, this can be only valid of it as an object of possible experience, and not as a thing in itself, outside all possible experience. Now the subjective condition of all our possible experience is life; consequently, the permanence of the soul can only be inferred in life, for the death of man is the end of all experience, of

which the soul is an object, unless the contrary be proved, and this is precisely the question. Hence, the permanence of the soul can only be proved in the life of man (the proof of which will not be required of us), but not after death, which is the real point at issue, for the general reason that the conception of substance, viewed as necessarily conjoined with the conception of permanence, is only [based on] an axiom of possible experience, and therefore only serviceable for the purposes of the latter.[1]

§ 49.

That something real not merely corresponds but must correspond to our external perceptions, can be proved as concerns experience, but not as a connection of things in themselves. This is as much as to say, that something of an empirical kind, as phenomenon in space, exists outside us, can be proved; for with objects, other than those belonging to a possible experience, we have nothing to do, because, inasmuch as they can be given in no experience,

[1] It is indeed very remarkable that the metaphysicians of all times should have so carelessly passed over the permanence of substances without ever attempting a demonstration of it, doubtless because they saw themselves forsaken by all proofs as soon as they began [to deal] with the conception of substance. Common sense, well aware that without this assumption no union of perceptions in an experience is possible, supplied this deficiency by a postulate; for from experience itself it could never have drawn this axiom; partly because it could not pursue the matters (substances) in all their changes and dissolutions far enough to find the matter for ever undiminished; partly because it contained the axiom of *necessity*, which is always the sign of an *à priori* principle. Now they composedly applied this axiom to the conception of the soul as a substance, and inferred its necessary continuance after the death of man, especially as the simplicity of this substance, deduced from the indivisibility of consciousness, assured it against destruction by dissolution. Had they found the real source of this axiom, which, however, demanded much deeper investigations than they were disposed to give to it, they would have seen that the above law, of the permanence of substances, only obtains for the sake of experience, and for things in so far as they are to be cognised and connected with others in experience, and that it can never be valid of things, irrespective of all possible experience, such as the soul after death.

they are to us nothing. That is empirically outside me which can be intuited in space, and as the latter, together with all the phenomena it contains, belongs to the presentations, whose connection according to the laws of experience proves their objective reality, just as much as the connection of the phenomena of the internal sense proves the reality of my soul, as an object of the internal sense; so, by means of external experience, I am just as conscious of the reality of bodies as external phenomena in space, as I am of the existence of my soul in time by means of the internal experience, which I also cognise only through phenomena, as an object of the internal sense, [that is, as] constituting an internal condition, of which the essence in itself, lying at the foundation of these phenomena, is unknown to me. The Cartesian idealism only distinguishes external experience from dream; its regularity being the criterion of the truth of the one as against the irregularity and false illusion of the other. It presupposes, in both of them, space and time as conditions of the reality of the objects, and only asks whether the objects of our external sense, which when awake we meet with in space, are really to be found therein, and in the same way whether the object of the internal sense, the soul, really exists in time; in other words, whether experience can afford certain criteria for the distinction between truth and imagination. Now this doubt may be easily decided, and we always do decide it in common life, in that we investigate the connection of the phenomena in both according to universal laws of experience, and we cannot doubt, when the presentation of external things thoroughly agrees with these, that they constitute reliable experience. Material idealism may accordingly be refuted very easily, inasmuch as phenomena *quâ* phenomena are only considered as to their connection in experience; and it is just as certain an experience that bodies exist outside ourselves (in space), as that I myself according to the presentation of the internal sense exist (in time); for the conception of *outside ourselves*, denotes simply existence in space. But as the *I* in the proposition *I am*, signifies not merely the object of internal intuition (in time) but the subject of consciousness, so in the same way *body* signifies

not merely the external intuition (in space), but also the thing *in itself* at the basis of this phenomenon, and hence the question as to whether bodies (as phenomena of the external sense) exist *apart from my thoughts* as bodies, may, in the nature of things, bo denied without hesitation. But there is no difference as to the question, whether I myself as phenomenon of the *internal sense* (soul, according to the empirical psychology) exist in time, apart from my power of presentation, for this must be just as much denied. In the same way, everything when reduced to its true meaning is decided and certain. Formal idealism (otherwiso called transcendental by me) really refutes the matorial or Cartesian [idealism]. For if space be nothing but a form of my sensibility, it is just as real as a presentation in mo as I am myself, and tho question only turns on the empirical truth of phenomena in the same. If this, however, bo not the case, but space and the phenomena [contained] therein are something existing outside ourselves, all criteria of experience, apart from our perception, can never provo tho reality of the objects external to us.

§ 50.

COSMOLOGICAL IDEA (Critique, p. 256).

This product of the pure Reason in its transcendent use is its most remarkable phenomenon, and is moreover the one most powerful in awakening philosophy out of its dogmatic slumber, and in urging it on, to the heavy tasks of the Critique of the Reason.

I term this idea cosmological, because it always takes its object from the world of sense, and only requires those [conceptions] whose object is an object of sense, being therefore native [immanent] and not transcendent, and consequently, thus far, no idea; while, on the other hand, to conceive the soul as a simple substance, is equivalent to conceiving an object (the simple) which cannot be presented to the senses. But notwithstanding this, the cosmological idea extends the connection of the conditioned with its condition (whether mathematical or

dynamical) so far, that experience can never reach it, and hence remains, as regards this point, always an idea, the object of which can never be adequately given in any experience whatever.

§ 51.

It is here that the usefulness of a system of categories shows itself so plainly and unmistakably, that, even were there not several other proofs of it, this alone would quite sufficiently demonstrate its indispensableness in the system of the pure Reason. There are not more than four of these transcendent ideas, as many as there are classes of categories; but each of them is only concerned with the absolute completion of a series of conditions to a given conditioned. In accordance with these cosmological ideas there are four dialectical assertions of the pure Reason, which, inasmuch as they are dialectical, show that to each one is opposed a contradictory assumption, on equally plausible principles of the pure Reason; and this is a conflict no metaphysical art of the subtlest distinction can avoid, but which compels philosophers to go back to the primary sources of the pure Reason. The above antinomy, which is not arbitrarily invented, but has its basis in the nature of the human Reason, and is hence unavoidable and never-ending, contains the following four theses together with their antitheses:—

1.

Thesis.	*Antithesis.*
The world has a *beginning* (boundary) in time and space.	The world is *infinite* in time and space.

2.

Thesis.	*Antithesis.*
Everything in the world consists of *simple* [parts].	There is nothing simple, but everything is *composite.*

3.

Thesis.	*Antithesis.*
There are in the world causes through *freedom.*	There is no freedom, but all is *Nature.*

4.

Thesis.	*Antithesis.*
In the series of world-causes there exists a *necessary* being.	There is nothing necessary, but in this series *all is contingent.*

§ 52.

The above is the most remarkable phenomenon of the human Reason, of which no instance can be shown in any other sphere. If, as generally happens, we regard the phenomena of the world of sense as things in themselves; if we assume the principles of their connection as universal of things in themselves and not merely as principles valid of experience, as is usual and indeed unavoidable without our Critique; then an unexpected conflict arises, never to be quelled in the ordinary dogmatic way, because both theses and antitheses can be demonstrated by equally evident, clear and irresistible proofs—for I pledge myself as to the correctness of all these proofs—and the Reason thus sees itself at issue with itself, a state over which the sceptic rejoices, but which must plunge the critical philosopher into reflection and disquiet.

§ 52b.

One may bungle in metaphysics in many ways, without any danger of being detected in fallacy. For if we only do not contradict ourselves, which is quite possible in synthetic propositions, even though they may be purely invented, we can never in such cases (the conceptions we connect, being mere ideas, which as to their whole content can never be given in experience) be refuted by experience. For how should we decide by experience whether the world exists from eternity, or has a beginning? or whether matter is infinitely divisible, or consists of simple parts? Such conceptions cannot be given in any, even the largest possible experience, and therefore the fallacy of the propositions maintained or denied cannot be discovered by that test.

The only possible case in which the Reason could reveal

against its will its secret dialectic, fallaciously given out by it as dogmatic, would be, if it grounded an assertion on a universally admitted axiom, and from another, equally conceded, drew a precisely opposite conclusion, with the greatest logical accuracy. This case is here realised, and indeed in respect of four natural ideas of the Reason whence four assertions on the one hand, and just as many counter-assertions on the other, arise, each as a correct consequence from universally admitted premises, and thereby reveal the dialectical illusion of the pure Reason in the use of these principles, which must otherwise have been for ever hidden.

Here then is a decisive attempt, which must necessarily disclose to us the fallacy lying hidden in the assumptions of the Reason.[1] Of two mutually contradictory propositions, both cannot be false, unless the conception at their basis be itself contradictory. For instance, two propositions, a square circle is round and a square circle is not round, are both false. For as regards the first, it is false that the [figure] mentioned is round, because it is square, but it is also false that it is not round, or that it is square, because it is a circle. For in this consists the logical mark of the impossibility of a conception, that under the same assumption two contradictory propositions would be equally false; in other words, because no middle can be conceived between them, *nothing at all* is cogitated by that conception.

§ 52c.

Now, a contradictory conception like the foregoing lies at the basis of the two first antinomies, which I call

[1] Hence I am anxious that the critical reader should especially occupy himself with this antinomy, because Nature herself seems to have set it up, in order to make the Reason stagger in its pretensions, and to force it into self-examination. Each proof that I have given, as well for the thesis as the antithesis, I undertake to guarantee, and thereby to exhibit the certainty of this unavoidable antinomy of the Reason. If the reader is only brought by this singular phenomenon to go back to the examination of the assumption at its foundation, he will feel himself compelled to investigate more deeply with me the primary foundation of all cognition of the pure Reason.

mathematical, because they are concerned with the addition or division of things similar in Nature; and thence I explain how it happens that thesis and antithesis are alike false.

When I speak of objects in time and space, I do not speak of things in themselves, because of these I know nothing, but only of things in the phenomenon, in other words, of experience, as the special mode of the cognition of objects, which is alone vouchsafed to man. I must not say that what I think in space or in time exists in itself in space and time apart from this my thought; for I should then contradict myself, because space and time, together with the phenomena in them, are nothing existing in themselves and apart from my presentations, but are themselves only modes of presentations, and it is obviously contradictory to say that a mere mode of our presentation exists outside our presentation. The objects of sense exist then only in experience; and to give them a special substantive existence for themselves, apart from or before the latter, is equivalent to imagining that experience can be present without or before experience.

Now, when I inquire as to the size of the world in space and time, it is for all my conceptions just as impossible to say, it is infinite, as it is finite. For neither of them can be contained in experience, because experience is neither possible respecting an *infinite* space, or an infinite time, or the boundary of the world by an empty space or a previous empty time; these [things] are only ideas. Hence as regards either one or the other kind of determinate quantity, it must lie in the world itself, separate from all experience. But this contradicts the conception of a world of sense, which is only a content of experience, whose reality and connection takes place in presentation, namely, in experience, because it is not a thing in itself, but is itself nothing but a mode of presentation. It follows from the above, that, as the conception of a self-existent world is in itself contradictory, the solution of the problem as to its size will be always fallacious, no matter whether it be affirmatively or negatively attempted.

The same applies to the second antinomy, which con-

cerns the division of phenomena. For these are mere presentations, and the parts exist merely in their presentation, and therefore in their division; in other words, in a possible experience in which they are given, and they only extend as far as the latter reaches. To assume that a phenomenon, for instance, that of body, contains all parts in itself, before all experience, to which nought but possible experience can ever attain, is equal to giving to a mere appearance, which can exist only in experience, a special existence preceding experience, or to say that mere presentations are there before they are met with in the faculty of presentation, which contradicts itself; and so, consequently, does every solution of this misunderstood problem, whether it be maintained that bodies consist of infinitely many parts, or of a finite number of simple parts.

§ 53.

In the first class of antinomy (the mathematical), the fallacy of the assumption consisted in that what is self-contradictory (namely, phenomenon and thing in itself) was represented as capable of union in one idea. But as regards the second, or dynamical class of antinomy, the fallacy of the assumption consists in that what is capable of union is represented as contradictory, and consequently, as in the first case, both contradictory assertions were false; so here, where they are opposed to one another merely through misunderstanding, both may be true.

The mathematical connection necessarily presupposes homogeneity in the connected (in the conception of quantity), while the dynamical by no means requires this. Where the quantity of the extended is concerned, all the parts must be homogeneous, both with each other and with the whole; whereas in the connection of cause and effect, although homogeneity may also be met with, it is not necessary. For the conception of causality, by means of which a thing is posited by something quite distinct therefrom, at least does not require it. If the objects of the sense-world were taken for things in themselves, and the above-cited laws of Nature for laws

of things in themselves, the contradiction would be unavoidable. In the same way, if the subject of freedom were presented like other objects as mere appearance, the contradiction would be equally unavoidable; for the same thing would be at once affirmed and denied of the same kind of object in the same sense. But if natural necessity be referred merely to phenomena, and freedom merely to things in themselves, no contradiction arises, in assuming or admitting both kinds of causality, however difficult or impossible it may be to render the latter kind comprehensible.

In the phenomenon, every effect is an event, or something that happens in time; a determination of the causality of its cause (a state of the same), must precede it, upon which it follows according to a uniform law. But this determination of the cause to causality must also be something that takes place, or *happens*. The cause must have *begun* to *act*, otherwise between it and the effect, no succession in time could be conceived. The effect would always have existed, as well as the causality of the cause. Thus, among phenomena, the *determination* of the cause *to the effect* must also have arisen, and therefore be just as much as its effect, an event which, in its turn, must have a cause, and so on; and consequently, necessity must be the condition according to which the efficient causes are determined. If, on the other hand, freedom be a characteristic of certain causes of phenomena, it must, as regards the latter as events, be a faculty of beginning them *from itself* (*sponte*), i.e., without the causality of the causes themselves having begun, and hence another ground would be necessary to determine its beginning. In that case, however, the *cause*, as to its causality, must not be subject to time determinations of its state; that is, it must *not* be *phenomenon*, but it must be regarded as a thing in itself, and its *effects* only, as *phenomena*.[1] If one can conceive such

[1] The idea of freedom finds a place solely in the relations of the *intellectual* as cause to the *phenomenon* as effect. Hence we cannot attribute freedom to matter with regard to the ceaseless action with which it fills its space, although this action results from an internal principle. Just as little can we find any conception of freedom suited

an influence of the essences of the understanding on phenomena without contradiction, though necessity would attach to all connection of cause and effect in the sense-world, yet of the cause which is itself no phenomenon, although it lies at the foundation of the latter, freedom would be admitted. Thus Nature and Freedom can be attributed without contradiction to the same thing, at one time as phenomenon, at another, as thing in itself.

We have a faculty within us, not only standing in connection with its subjective determining grounds, which are the natural causes of its actions, and in so far the faculty of a being, belonging to phenomena, but also referable to objective grounds, though these are merely ideas, in so far as they can determine this faculty; and this connection is expressed by *ought*. The above faculty is termed *Reason*, and when we contemplate a being (man) simply according to this subjectively determining Reason, it cannot be regarded as an essence of sense, but the quality thought of is the quality of a thing in itself, of the possibility of which, namely, the *ought* of that which has never happened, and yet the activity of which can be the determination and cause of actions, whose effect is phenomenal in the sense-world, of this we can form no conception whatever. At the same time, the causality of the Reason as concerns its effects in the sense-world would be freedom, so far as *objective grounds*, which are themselves ideas, are regarded as determining these effects. For its action would then depend not on subjective, and there-

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to pure essences of the understanding; as, for instance, God, in so far as His action, is immanent; for His action, although independent of external determining causes, is nevertheless determined in His eternal Reason, that is, in the divine nature. Only *if an action* is to *commence* something, in other words, if the effect is to be met with in the time-series, and consequently in the sense-world (e.g., the beginning of the world), only then does the question arise whether the causality of the cause itself must commence, or whether the cause can give rise to an effect without its causality itself commencing. In the first case the conception of this causality is a conception of necessity, in the second, of freedom. The reader will see from the above that in explaining freedom to be the faculty of beginning an event spontaneously, I exactly hit the conception constituting the problem of metaphysics.

fore on time-conditions, nor on natural laws, serving to determine these, since grounds of the Reason in general would furnish the rule for actions according to principles, without the influence of circumstances, time, or place.

What I adduce here, is merely meant as an instance for the sake of intelligibility, and does not necessarily belong to our question, which must be decided from mere conceptions, independently of the qualities we meet with in the real world.

I can say now without contradiction, that all actions of rational beings, inasmuch as they are phenomena, met with in any experience, are subject to necessity; but precisely the same actions, with reference to the rational subject, and its capacity of acting according to mere Reason, are free. For what is demanded by necessity? Nothing more than the determinability of every event in the sense-world according to uniform laws; in other words, a reference to Cause in the phenomenon, whereby the thing in itself, lying at its foundation, and its causality, remains unknown. But I say: the natural law subsists alike, whether the rational being [acting] from Reason, and hence through freedom, be the cause of the effects in the sense-world, or whether these are determined by other grounds than those of Reason. For in the first case, the action happens according to maxims, whose effect in the phenomenon will be always in accordance with uniform laws; in the second case, if the action does not happen according to principles of the Reason, it is subordinated to the empirical laws of the sensibility, and in both cases the effects are connected according to uniform laws; more than this we do not require to [constitute] natural necessity, nay, more we do not know respecting it. But in the first case, Reason is the cause of these natural laws, and is hence free; in the second case, the effects follow the mere natural laws of the sensibility, because the Reason exercises no influence upon them; the Reason, however, is not on this account itself determined by the sensibility (which is impossible), and is consequently in this case also free. The freedom does not hinder the natural law of the phenomena, any more than the latter interferes with the freedom of the practical use of the Reason, which

stands in connection with things in themselves as determining grounds.

In this way, the practical freedom, namely, that by which the Reason has causality, according to objective determining grounds, is saved, without natural necessity being curtailed in the least, in respect of the same effects as phenomena. The above may also be serviceable as an explanation of what we had to say regarding transcendental freedom, and its union with natural necessity (in the same subject, but not taken in the same connection). For as to this, every beginning of the action of a being, from objective causes, so far as its determining grounds are concerned, is always a *first beginning*, although the same action in the series of phenomena is only a *subaltern beginning*, necessarily preceded by a state of the cause determining it, and itself determined by a [state] immediately preceding; so that without falling into contradiction with the laws of Nature, we may conceive of a faculty in rational beings, or in beings generally, in so far as their causality is determined in them, as things in themselves, by which a series of states is begun of themselves. For the relation of the action to objective grounds of the Reason is no relation in time; here, what determines the causality does not precede the action according to time, because such determining grounds [as these] do not present a reference of the objects to sense, or, in other words, to causes in the phenomenon, but to determining causes, as things in themselves, which are not subordinated to time-conditions. Hence, the action may be viewed with regard to the causality of the Reason as a first beginning, but at the same time, as regards the series of the phenomena, as a merely subordinate beginning, and without contradiction, in the former aspect as free, and in the latter, inasmuch as it is merely phenomenon, as subordinate to natural necessity.

As concerns the *fourth* antinomy, it is solved in the same manner as is the conflict of the Reason with itself, in the third. For if the *cause in the phenomenon* be only distinguished from *the cause of the phenomena*, so far as they can be considered as *things in themselves*, both propositions can subsist beside one another, namely, that no cause takes

place anywhere in the sense-world (according to similar laws of causality) whose existence is absolutely necessary; while, on the other hand, this world may be connected with a necessary being as its cause, though of another kind, and according to other laws; the incompatibility of the above two propositions simply resting on the misunderstanding by which what is merely valid of phenomena is extended to things in themselves, both being mixed up in one conception.

§ 54

This is the arrangement and solution of the whole antinomy, in which the Reason finds itself involved, in the application of its principles to the sense-world, and of which even this (the mere arrangement) would be itself a considerable service to the knowledge of the human Reason, even though the solution of the conflict should not fully satisfy the reader, who has here a natural illusion to combat, which has only recently been presented to him as such, and which he has previously regarded as true. For one consequence of this is inevitable, namely, that seeing it is quite impossible to get free of this conflict of the Reason with itself, so long as the objects of the sense-world are taken for things in themselves, and not for what they are in reality, namely, mere phenomena, the reader is necessitated thereby again to undertake the deduction of all our knowledge *à priori*, and its examination as given by me, in order to come to a decision in the matter. I do not require more [than this] at present; for if he has but first penetrated deeply enough into the nature of the pure Reason, the conceptions by which the solution of this conflict of the Reason is alone possible, will be already familiar to him, without which circumstance I cannot expect full credit even from the most attentive reader.

§ 55.

III. THEOLOGICAL IDEA (Critique, p. 350).

The third transcendental idea, which furnishes material to the most important, but, when merely conducted

speculatively, to the exaggerated (transcendent) and thereby dialectical use of the Reason, is the ideal of the pure Reason. The Reason does not here, as with the psychological and cosmological ideas, start from experience, and is not, by a [progressive] raising (*Steigerung*) of the grounds, misled into an endeavour to contemplate the series in absolute completeness, but wholly breaks therewith, and from mere conceptions of what would constitute the absolute completeness of a thing in general, and consequently by means of the idea of a most perfect original being, descends to the determination of the possibility, and thereby also to the reality, of all other things. For this reason, the mere assumption of a being, which although not given in the series of experience, is nevertheless conceived for the sake of experience, to render comprehensible the connection, order, and unity of the latter, that is, the *Idea* is more easily distinguishable from the conceptions of experience [in the present] than in the foregoing cases. The dialectical illusion therefore arising from our holding the subjective conditions of our thought for the objective conditions of things themselves, and a necessary hypothesis for the satisfaction of our Reason for a dogma, may be easily exposed to view; and hence I have nothing further to recall on the assumptions of the transcendental theology, for what the Critique has said on this point is comprehensible, clear, and decisive.

General Remark on the Transcendental Ideas.

§ 56.

The objects given us through experience are in many respects incomprehensible, and there are many problems to which the natural law leads us, when it is carried to a certain height, (though always in accordance with these laws,) which can never be solved; as for instance, how it is that substances attract one another. But, if we entirely leave Nature, or in the progress of its connection overstep all possible experience, and thereby immerse ourselves in mere ideas, we cannot then say that the object is incomprehensible, and that the nature of things

places insoluble problems before us; for we have in that case, nothing whatever to do with Nature or with given objects, but merely with conceptions, having their origin simply in our Reason, and with mere essences of thought, in respect of which all problems arising from the conception of the same, can be solved, because the Reason can and must certainly give a complete account of its own procedure.[1] As the psychological, cosmological, and theological ideas, are simply conceptions of the Reason, not capable of being given in any experience, so the problems which the Reason in respect thereof places before us, are not propounded by the objects, but by mere maxims of the Reason for its own satisfaction, and must be capable of being adequately answered in their totality, which is effected by showing them to be principles [designed] to bring the use of our understanding to thorough agreement, completeness and synthetic unity, and which are in so far valid merely of experience, but of the *whole* of the latter.

Now, although an absolute whole of experience is impossible, the idea of a whole of knowledge according to principles in general, is what alone can procure a particular kind of unity, namely, that of a system, without which our knowledge is nothing but a patchwork, and cannot be used for the highest end (which is always the system of all ends); by this I understand not merely the practical, but also the highest end of the speculative use of the Reason.

The transcendental ideas express, then, the specific destiny of the Reason, namely, as being a principle of the systematic unity of the use of the understanding.

[1] Herr Plattner in his Aphorisms says with acuteness, §§ 728, 729: "If the Reason be a criterion no conception can be possible which is incomprehensible to the human Reason. In the real alone is incomprehensibility to be found. Here the incomprehensibility arises from the insufficiency of the ideas acquired." It, therefore, only sounds paradoxical and is really not strange to say that in Nature there is much that is incomprehensible (for instance, the faculty of procreation), but that when we rise higher and pass beyond Nature all is again comprehensible; for we then quit the objects that can be given us, and occupy ourselves merely with ideas, by which we may well comprehend the law wherewith the Reason prescribes to the Understanding its use in experience, because it is its own product.

But when this unity of the mode of cognition be viewed as though it depended upon the object of cognition; when we hold that which is merely *regulative* for *constitutive*, and persuade ourselves that we can extend our cognition by means of these ideas, far beyond all possible experience in a transcendent manner, notwithstanding that they merely serve to bring experience as nearly as possible to completeness, i.e., to limit its progress by nothing which cannot belong to experience—then this is a simple misunderstanding in judging the special destiny of our Reason and its principles, and a dialectic, partly confusing the use of the Reason in experience, and partly making the Reason to be at issue with itself.

CONCLUSION.

ON THE DETERMINATION OF THE BOUNDARY OF THE PURE REASON.

§ 57.

After all the very clear proofs we have above given, it would be absurd for us to expect to cognise more on any object than what belongs to its possible experience, or to lay claim to the least knowledge of anything whatever which would determine its constitution in itself, unless we assume it to be an object of possible experience. For wherewith shall we effect this determination, inasmuch as time, space, and all the conceptions of the understanding, and still more the conceptions derived from empirical intuition or *perception* in the sense-world would neither have nor could have any other use than merely to make experience possible, and when if we leave out this condition from the pure conceptions of the understanding, they determine no object whatever, and have no significance anywhere [?].

But it would be a still greater absurdity for us not to admit things in themselves at all, or to wish to give out our experience for the only possible mode of the cognition of objects, in other words, our intuition in space and time for the only possible intuition, and our dis-

cursive understanding for the model of every possible understanding, thereby wishing principles of the possibility of experience to be held for the universal conditions of things in themselves.

Our principles, which limit the use of the Reason to possible experience, might accordingly become *transcendent*, and the limits of our Reason be given out for the limits of things themselves, of which Hume's Dialogues may serve as an example, if a careful Critique of the boundaries of our Reason did not keep watch on its empirical use, and set a limit to its pretensions. Scepticism originally arose from metaphysics and its anarchical (*Polizeilosen*) dialectic. At first, to favour the empirical use of the understanding, it might well give out for nugatory and deceptive all that exceeded this; but gradually, as it became evident that the very same principles which we make use of in experience are *à priori*, and that they led unobserved, and as it seemed with the same right, still farther than experience reaches, a doubt began to be thrown on the principles of experience themselves. Now as to these there is no danger, for herein a healthy understanding will always assert its rights; but there arose a special confusion in the science, which could not determine how far, and why only thus far and no farther, the Reason is to be trusted; but this confusion can only be got rid of, and any future relapse prevented, by a formal limitation of the use of our Reason, derived from principles. It is true we cannot form any definite conception of what things in themselves, beyond all possible experience, may be. But we are nevertheless not free to withdraw ourselves wholly from the inquiry as to these; for experience never fully suffices for the Reason; it thrusts us ever farther and farther back for the answer to this question, and leaves us as regards its complete solution dissatisfied; as any one can see from the dialectic of the pure Reason, which on this account has its valid subjective ground. Who can tolerate [the circumstance] that by the nature of our soul we can attain to the clear consciousness of the subject, and to the conviction that its phenomena cannot be explained *materialistically* without asking what the soul really is, and if no empirical conception suffices [to explain]

this, at least assuming a conception of the Reason (of a simple immaterial essence) merely for the above purpose, although we cannot demonstrate its objective reality in any way? Who can satisfy himself in all cosmological questions, as to the size and duration of the world, of freedom or natural necessity, with mere empirical knowledge, since, begin it as we will, every answer given according to the fundamental laws of experience, gives birth to a new question, just as much requiring an answer, and thereby clearly exposing the inadequacy of all physical modes of explanation for the satisfaction of the Reason? Finally, who in the face of the thoroughgoing contingency and dependence of all that he can assume and think according to empirical principles, does not see the impossibility of taking his stand on these, and does not feel himself necessarily impelled, in spite of all prohibition against losing himself in transcendent ideas, to seek rest and satisfaction beyond all conceptions he can verify by experience, in that of a Being, of whom the possibility of the idea in itself cannot indeed be apprehended, but which cannot be refuted, because it is a mere being [essence] of the understanding, and without which the Reason must remain for ever unsatisfied.

Boundaries (with extended beings) always presuppose a space, met with, outside a certain definite place, and enclosing it. Limits do not require this, being mere negations affecting a quantity, so far as it has no absolute completeness. Our Reason, however, sees around it as it were a space for the cognition of things in themselves, although it can never have definite conceptions of them, being limited to phenomena.

As long as the cognition of the Reason is homogeneous, no definite boundaries can be conceived therein. In mathematics and natural science the human Reason recognises indeed limits but no boundaries, i.e., [it recognises] that something exists outside itself, to which it can never attain, but not that it can itself be anywhere terminated in its inner progress. The extension of our views in mathematics and the possibility of new inventions reaches to infinity; and the same can be said of the discovery of new qualities in Nature, and of new forces and laws, through con-

tinued experience and the union of the same by the Reason. But, at the same time, it cannot be mistaken that there are limits here, for mathematics refers only to *phenomena*, and what cannot be an object of sensuous intuition, such as the conceptions of metaphysics and morals, lies wholly outside its sphere, [in a region] to which it can never lead, and which does not at all require it. There is, then, a continuous progress and approach to these sciences, and as it were a point or line of contact. Natural science will never discover for us the inner [nature] of things, namely, that which is not phenomenon, but which can still serve as the highest ground of the explanation of phenomena. But it does not require this for its physical explanations; nay, if such were offered it from another source (e.g., the influence of immaterial beings), it ought to reject it, and on no account to bring it into the course of its explanations, but invariably to base these on that which pertains to experience as object of sense, and which can be brought into connection with our real perceptions, and empirical laws.

But metaphysics leads us to boundaries in the dialectical attempts of the pure Reason (which are not commenced arbitrarily or rashly, but to which the nature of the Reason itself urges us), and the transcendental ideas, as we cannot have intercourse with them, and as they will never allow themselves to be realised, serve, not only to show us the actual boundaries of the use of the pure Reason, but also the way to determine them. And this is also the end and use of this natural disposition of our Reason, which has given birth to metaphysics as its pet child, whose generation, like that of everything else in the world, is not to be ascribed to chance, but to an original germ, wisely organised for great ends. For metaphysics is, perhaps more than any other science, rooted in us in its fundamental features by Nature herself, and can by no means be regarded as the product of a voluntary choice or as chance extension in the progress of experiences (from which it is wholly divided).

The Reason, though all its conceptions and laws of the understanding are adequate in the sense-world, does not find any satisfaction for itself in them, for it is deprived of all hope of a complete solution by questions recurring *ad infinitum*. The transcendental ideas which have this

completion for an object are such problems of the Reason. It sees clearly that the sense-world cannot contain the completeness [required], and therefore just as little can those conceptions which serve simply to the understanding of the same, namely, space and time, and all that we have adduced under the name of pure conceptions of the understanding. The sense-world is nothing but a chain of phenomena, connected according to universal laws, and has therefore no subsistence for itself, being not properly the thing in itself, and only being necessarily referable to that which contains the ground of this phenomenon, to essences that cannot be cognised merely as phenomena but as things in themselves. Only in the cognition of these can Reason hope to see its desire for completeness in the progress from the conditioned to its conditions, once for all satisfied.

We have above (§§ 33, 34) assigned the limits of the Reason in respect of all cognition of mere essences of thought. Now, as the transcendental ideas make the progress up to these necessary, and have thus led us, as it were, to the contact of the full space (of experience) with the void of which we know nothing (to the *noumena*), we can determine the boundaries of the pure Reason. For in all boundaries there is something positive (for instance surface is the boundary of corporeal space and yet is itself a space; line, a space which is the boundary of the surface; point, the boundary of the line, but still [occupying] a position in space), while, on the other hand, limits contain mere negations. The limits assigned in the paragraph cited, are not sufficient, after we have found that something lies beyond them (although we can never know what this may be in itself). For the question is now, what is the attitude of our Reason in this connection of that which we know, with that which we do not know, and never can know? Here is a real connection of the known with a wholly unknown (and something that will always remain unknown), and even if in this the unknown should not become in the least [degree] more known —which is indeed not to be expected—the conception of this connection must be able, notwithstanding, to be determined and reduced to distinctness.

We are obliged, then, to think of an immaterial essence, an intelligible world, and a highest of all beings (mere *noumena*), because only in these, as things in themselves, does the Reason meet with the completeness and satisfaction it can never hope for from the derivation of phenomena from their homogeneous ground, because they really refer to something distinct from the latter (and therefore wholly heterogeneous), inasmuch as phenomena always presuppose a thing in itself, and indicate this, [it matters not] whether we may know it more closely or not.

But as we can never know these essences of the understanding as to what they may be in themselves, that is, determinately, but are obliged nevertheless to assume such in relation to the sense-world, and to connect them with it through the Reason, we shall be at least able to cogitate this connection by means of such conceptions as express its relation to the sense-world. For if we cogitate the essence of the understanding, through nothing but pure conceptions of the understanding, we really cogitate thereby nothing definite, and our conception is consequently without meaning; if we cogitate it through qualities borrowed from the sense-world, then it is no longer an essence of the understanding, but is conceived as one of the phenomena, and belongs to the sense-world. We will take an instance from the conception of the Supreme Being.

The *deistic* conception is an entirely pure conception of the Reason, which, however, only represents a thing containing all reality, without our being able to determine a single one of its [qualities], because for this an instance would have to be borrowed from the sense-world, in which case I should always have to do with an object of sense, and not with something completely heterogeneous, and which cannot be an object of sense. For instance, I attribute understanding to it; but I have no conception whatever of any understanding but of one like my own, namely, of one to which intuitions must be given through the senses, and which occupies itself with reducing these under rules of the unity of the consciousness. But then the elements of my conception would always lie in the phenomenon; yet I was necessitated by the inadequacy of

the phenomena to pass beyond this, to the conception of a being in no way dependent on phenomena, or bound up with them, as conditions of its determination. If, however, I sever the understanding from the sensibility in order to have a pure understanding, nothing remains over but the mere form of thought without intuition, by means of which I can cognise nothing determinate as object. For this purpose I should have to conceive another understanding which intuited objects, but of which I have not the least conception, because the human understanding is discursive and can only cognise through universal conceptions. But I am also involved in contradiction if I attribute will to the Supreme Being. For I have this conception only in so far as I derive it from my inner experience, and thereby from the dependence of my satisfaction from objects whose existence we require; but at the foundation of this lies sensibility, which wholly contradicts the pure conception of the Supreme Being. The objections of Hume to Deism are weak, touching no more than the proofs, and never the proposition of the deistic assertion itself. But as regards Theism, which must be arrived at by a closer determination of our, there [viz., in Deism], merely transcendent conception of the Supreme Being, they are very strong, and, according as the conception is constructed, in certain (indeed in all ordinary) cases are irrefragable. Hume always insists, that through the mere conception of an original being, to whom we can attribute none but ontological predicates (eternity, omnipresence, omnipotence) we really think nothing definite, but that qualities expressing an object *in concreto* must be superadded. It is not enough to say it is Cause, but [we must also say] what is the nature of its causality, as, whether [it operates] through understanding and will; and at this point his attacks on the thing itself, namely, on Theism, commence, whereas before he had only stormed the grounds of proof of Deism, which does not carry any especial danger with it. His dangerous arguments refer entirely to anthropomorphism, which he holds to be inseparable from Theism, and to make it contradictory in itself; while if this be left out, [Theism itself] would also fall, and nothing would remain but a Deism wherewith

nothing could be done, which could not avail us for anything, and could not serve as a foundation for religion and morals. If this inevitability of anthropomorphism were certain, the proofs of the existence of a Supreme Being might be what one liked, and all conceded, yet the conception of this Being would never be able to be determined by us, without involving ourselves in contradictions.

But if with the injunction to avoid all transcendent judgments of the pure Reason, we connect the apparently contradictory injunction to proceed to conceptions lying outside the field of its immanent (empirical) use, we shall be aware that both may subsist together, but only on the exact *boundary* of all admissible use of the Reason; for this belongs as much to the field of experience as to that of essences of thought, and we shall be taught thereby, at the same time, how the above remarkable ideas serve simply, for the determination of the boundaries of the human Reason; namely, on the one hand not to extend cognition of experience in an unbounded manner, so that nothing but mere world remains for us to cognise, and on the other hand not to pass beyond the boundaries of experience, or to seek to judge of things outside the latter as things in themselves.

But we keep to this boundary when we limit our judgment to the relation the world may have to a Being, whose conception itself lies outside all the cognition of which we are capable within the world. For in this case, we do not attribute to the Supreme Being any of the qualities *in themselves* by which we cogitate objects of experience, and thereby avoid the *dogmatic* anthropomorphism; but we apply the relations of the same to the world, and thereby allow ourselves a *symbolical* anthropomorphism, which as a matter of fact only concerns the language and not the object.

When I say we are obliged to regard the world *as though* it were the work of a supreme understanding and will, I do not really say more than—as a watch, a ship, a regiment is related to the artisan, shipbuilder or general, so is the sense-world (or all that which constitutes the foundation of this sum-total of phenomena) [related] to

the unknown, that I cognise, not indeed according to what it is in itself, but according to what it is for me, namely, in respect of the world, of which I am a part.

§ 58.

Such a cognition as this is one according to analogy, which does not signify an imperfect resemblance of two things, as the word is commonly taken [to mean], but a perfect resemblance of two relations between totally dissimilar things.[1] By means of this analogy a, *for us*, adequately defined conception of the Supreme Being remains, although we have left out everything that could *determine* it simply, and *in itself;* for we define it as regards the world, and therefore as regards ourselves, and more is not necessary for us. The attacks Hume makes on those who would define this conception absolutely, in that they borrow the materials from themselves and from the world, do not affect us; and moreover he cannot reproach us that there remains nothing over, after the objective anthropomorphism of the conception of the Supreme Being is taken away.

For at the outset, let the deistic conception of an original Being be conceded us as a necessary hypothesis (as Hume does in his Dialogues, in the person of Philo against Cleanthes), in which the original Being is

[1] Of this nature is an analogy between the juridical relations of human actions and the mechanical relations of moving forces: I can do nothing to another without giving that other the right, under the same conditions, to do the same to me; just as no body can act upon another body with its moving force without causing thereby that other body to react upon itself to the same extent. Here right and moving force are quite dissimilar things, but in their relation there is complete resemblance. Hence, by means of such an analogy as this, I can give a relational conception of things absolutely unknown to me. For instance, how the promotion of the happiness of children is related ($= a$), to the love of parents ($= b$), to the welfare of the human race ($= c$), to the unknown [quality] in God ($= x$), which we term love, not as though it had the least resemblance to any human affection, but because we can conceive its relation to the world as similar to that which things of the world have among one another. But the relational conception is here a mere category, namely, the conception of cause, which has nothing to do with sensibility.

conceived through purely ontological predicates, of substance, cause, &c. *This must be done*, because the Reason is impelled in the sense-world by mere conditions, which are themselves again conditioned, without the possibility of any satisfaction; *it can also be very well done*, without lapsing into anthropomorphism, which transfers predicates from the sense-world to a Being quite distinct from the world, inasmuch as these predicates [in our case] are mere categories, affording no definite [conception at all], and hence no conception of it limited to conditions of the sensibility. Nothing can hinder us, therefore, from predicating of this Being a *causality through Reason* in respect of the world, and so from passing over to Theism without being obliged to attribute to it this Reason, as a quality attaching to it in itself. For as regards the *first* point, the only possible way of pursuing the use of the Reason in respect of all possible experience in the sense-world, to its highest extent and in thorough agreement with itself, is when a supreme Reason is assumed as a cause of all connections in the world. Such a principle must be throughout advantageous to it, and can never injure it in its natural use. But *secondly*, the Reason is not transferred as a quality to the original Being in itself, but only *in its relation* to the sense-world, and thus anthropomorphism is altogether avoided. For here, only the cause of the form of Reason everywhere met with in the world is considered, and to the Supreme Being, so far as it is the ground of this form of Reason in the world, Reason is attributed, but only on the principle of analogy, i.e., in so far as this expression [viz., Reason] indicates what the, to us, unknown ultimate cause of the world has wherewith to determine all things therein, in the highest degree, in accordance with Reason. In this we take care to make use of the quality of Reason, not by its means to conceive God, but [rather] the world, as it is necessary to have the greatest possible use of the Reason in respect of the latter [determined] according to a principle. We confess thereby that the Supreme Being, as to what it may be in itself, is entirely impenetrable to us, and is even unthinkable *in a definite* manner, and hence we are prevented from making

any transcendent use of our conceptions, derived from the Reason as an efficient cause (by means of the will), for determining the divine nature, by qualities that are only borrowed from human nature, and thus from losing ourselves in gross or chimerical conceptions; but, on the other hand, [we are prevented] from inundating the view of the world, [attained] by our conceptions of the human Reason as transferred to God, with hyperphysical modes of explanation, and thus from degrading it, from its proper destination according to which it ought to be a study of mere Nature through the Reason, and not a presumptuous derivation of its phenomena from a supreme Reason. The expression suited to our feeble conceptions will be that we conceive the world *as though* it orginated from a supreme Reason, as to its reality and as to its inward determination, by which we partly recognise the constitution belonging to it, the world itself, though without presuming to wish to define its cause in itself; and partly, on the other hand, place the ground of this constitution *in the relation* of the supreme Cause to the world ([viz.] to the form of Reason in the world), without finding the world adequate for this purpose by itself.[1]

In this way the difficulties seeming to oppose Theism vanish, in that to the principle of Hume, not to push the use of the Reason dogmatically beyond all possible experience, another principle is united, completely overlooked by Hume, namely, not to mistake the field of possible experience for that which bounds itself in the eye of our Reason. Critique of Reason here signifies the true middle path between the dogmatism Hume combated, and the scepticism he would have introduced in its place, a middle path which is unlike other middle paths that attempt to determine themselves as it were mechanically (by taking something from one and some-

[1] I should say, the causality of the supreme Cause is, in respect of the world, what human Reason is in respect of art-works. The nature of the supreme Cause itself remains unknown throughout. I only compare its effect known to me (the order of the world) and its accordance with Reason, with the known workings of human Reason, and hence call the former a Reason, without thereby attributing to it as its characteristics, what I understand by this expression in men or anything else known to me.

thing from another), and by which no one is taught a better way, but one, such as can be determined accurately, according to principles.

§ 59.

I have made use of the metaphor of a boundary at the commencement of this observation, in order to fix the limits of the Reason in respect of its appropriate use. The sense-world contains merely phenomena, which are not things in themselves, yet the understanding must assume the latter (*noumena*), for the very reason that it recognises the objects of experience for mere phenomena. In our Reason both are alike included, and the question is: How does the Reason proceed in determining both fields? Experience, which contains all that belongs to the sense-world, is not bounded by itself; it only attains from one conditioned to another conditioned. That which shall bound it must lie wholly outside it, and this is the field of pure essences of the understanding. But this is for us a blank space, in so far as the *determination* of the nature of these essences of the understanding is concerned, and thus, when we have to do with dogmatically defined conceptions, we cannot pass beyond the field of possible experience. But as a boundary is itself something positive, belonging as much to what is within as to the space without a given content, so it is a really positive cognition, in which the Reason merely participates, by extending itself to this boundary, in such wise, that it does not attempt to go beyond the boundary, because it finds a blank space before it, wherein it can indeed cogitate forms to things, but cannot cogitate things themselves. But the *bounding* of the field of experience by something otherwise unknown to it, is a cognition remaining to the Reason in this standpoint, whereby it is not enclosed within the sense-world, neither is it left dreaming [*schwärmend*] outside it, but limits itself, as befits the knowledge of a boundary, to the relation of that which lies outside the same, to that which is within it.

Natural theology is a conception of this nature, at the

boundary of the human Reason, inasmuch as it sees itself necessitated to look beyond to the idea of the Supreme Being (and in a practical connection, also, to that of an intelligible world), not in order to determine anything in respect of this mere essence of the understanding, in other words, anything outside the world of sense, but to guide itself for its own use within the latter, according to principles of the greatest possible unity (theoretically as well as practically). And for this purpose it makes use of the reference of the same to an independent Reason as the cause of all these connections, thereby not merely *inventing* a being, but inasmuch as outside the world something must necessarily exist (*anzutreffen sein*) which only the understanding cogitates, *determining* it [viz., this being] in the above manner, although only on the principle of analogy.

In this way our original proposition remains, which is the result of the whole Critique: "that our Reason can never teach more by its principles *à priori* than simply objects of possible experience, and even of these no more than what can be cognised in experience." But this limitation does not prevent it from leading us to the objective *boundary* of experience, namely, the *reference* to something which is not itself object of experience, but is nevertheless the highest ground of all experience, without however teaching us anything respecting this in itself, but only with reference to its [viz., the Reason's] own complete use as directed to its highest end, within the field of possible experience. But this is also all the use that can be reasonably expected or even wished, as concerns it, and with this we have cause to be content.

§ 60.

Thus we have fully exhibited metaphysics according to its subjective necessity, as it is really given *in the natural disposition* of the human Reason, and indeed in what constitutes its essential purpose. We have found in the course of this investigation, that such a *merely natural* use of such a disposition of our Reason involves us in extravagant dialectical conclusions, partly apparently, and partly really, conflicting [with one another], if no

discipline bridles it and keeps it within limits, which is only possible by means of scientific criticism. And, in addition, [we have found] this fallacious metaphysics to be dispensable to the promotion of the knowledge of Nature, and even prejudicial to it. It always remains, notwithstanding, a task worthy of research, to find out the *natural ends* aimed at by this disposition in our Reason to transcendent conceptions, since everything in Nature must have been originally designed for some useful purpose.

Such an investigation is here out of place; I confess, moreover, that all I here say respecting the primary ends of Nature is only conjecture, but which may be permitted me in this case, as the question does not concern the objective validity of metaphysical judgments, but refers merely to the natural disposition to the latter, and thus lies outside the system of metaphysics, in that of anthropology.

When I compare all transcendental ideas whose content constitutes the special problem of the natural, pure Reason, compelling it to leave the mere contemplation of Nature and to pass beyond all possible experience, and in this endeavour to produce the thing (be it knowledge or nonsense) called metaphysics, I believe myself to have discovered that this natural disposition is intended to free our conceptions from the chains of experience and the limits of the mere contemplation of Nature, in so far that it may at least see a field opened before it, containing mere objects for the pure Reason, which cannot be arrived at by any sensibility. The purpose is not, indeed, to occupy ourselves speculatively with these objects, (because we can find no firm ground for our feet), but because practical principles, without finding such a space before them for their necessary expectation and hope, could not expand themselves to the universality, the Reason indispensably requires, from a moral point of view.

Now, I find that the *psychological* idea, however little may be the insight I obtain by its means into the pure nature of the human soul, which is raised above all conceptions of experience, at least sufficiently shows me the inadequacy of the latter, and thereby preserves me from

materialism as being a psychological conception of no avail for the explanation of Nature, and besides, as narrowing the Reason in its practical aspect. In the same way the *cosmological* ideas, by the obvious inadequacy of all possible knowledge of Nature to satisfy the Reason in its justifiable inquiries, serve to keep us from the Naturalism which proclaims Nature for self-sufficing. Finally, as all natural necessity in the sense-world is invariably conditioned, inasmuch as it always presupposes dependence of things on one another, and, as unconditioned necessity must be sought for in the unity of a Cause separate from the sense-world, (but the causality of which, if it were mere Nature, could yet never render comprehensible the existence of the contingent as its consequence;) [this being so,] the Reason frees itself by means of the *theological idea* from fatalism, as well from that of a blind natural necessity in the coherence of Nature. without a first principle, as in the causality of this principle itself, and leads to the conception of a cause through freedom, in other words, a supreme intelligence. Thus the transcendental ideas serve, if not to instruct us positively, at least to do away with the audacious assertions of *materialism, naturalism, and fatalism*, which narrow the field of the Reason, and thereby to procure a place for moral ideas outside the region of speculation; and this, as it seems to me, will in some measure explain the above natural disposition.

The practical utility a merely speculative science may have, lies outside the boundaries of this science, and hence can be merely viewed as a scholium, and, like all scholia, not as forming a part of the science itself. At the same time, this reference lies at least within the boundaries of philosophy, especially of that which draws from the sources of pure Reason, where the speculative use of the Reason in metaphysics must have a necessary unity with its practical use in morals. Hence the unavoidable dialectic of the pure Reason in metaphysics must be considered as natural disposition—not merely as an illusion requiring to be resolved, but as a *natural institution*, as concerns its end—deserving, if possible, to be ex-

plained, although this task, being supererogatory, cannot in justice be claimed of metaphysics proper.

As a second scholium, more related to the content of metaphysics, the solution of the problems must be regarded which are discussed in the Critique from pp. 410 to 432. For certain principles of Reason are there expounded, determining the order of Nature, or rather the understanding, which is to seek out her laws through experience, *à priori*. They seem to be constitutive and legislative in respect of experience, whereas they arise from mere Reason, which cannot be regarded like the understanding as a principle of possible experience. Now whether this agreement rests upon the fact that just as Nature is not itself dependent on the phenomena or their source, the sensibility, but only on the relation of the latter to the understanding; so the thorough-going unity of its use, for the sake of a complete possible experience (in a system), can only pertain to this understanding in its relation to the Reason—whether experience, in other words, stand mediately under the legislation of the Reason —[is a question which] may be further considered by those who desire to investigate the nature of the Reason, apart from its use in metaphysics, and to construct a systematic history of Nature upon general principles. This question I have indeed noticed as important in the book itself, although I have not attempted its solution.[1]

And thus I conclude the analytical solution of the problem I had myself proposed—How is metaphysics at all possible? having proceeded from that in which its use is really given, at least in its consequences, to the grounds of its possibility.

[1] It has been my constant design throughout the Critique to omit nothing that could render the investigation into the nature of the pure Reason complete, however deeply hidden it might be. Every one is at liberty afterwards to carry his researches as far as he likes, if it has been only indicated to him what yet remains to be done; for this may be reasonably expected of any one who has made it his business to survey this whole field, in order afterwards to consign it to others for future cultivation and allotment. To this department belong also both the scholia, which by their dryness will scarcely recommend themselves to amateurs, and hence have only been added for specialists.

SOLUTION OF THE GENERAL PROBLEM OF THE PROLEGOMENA.

How is Metaphysics possible as Science?

Metaphysics, as a natural disposition of the Reason, is real, but it is also, in itself, dialectical and deceptive (as was proved in the analytical solution of the third main problem). Hence to attempt to draw our principles from it, and in their employment to follow this natural but none the less fallacious illusion, can never produce science, but only an empty dialectical art, in which one school may indeed outdo the other, but none can ever attain a justifiable and lasting success. In order that, as science, it may lay claim not merely to deceptive persuasion, but to insight and conviction, a Critique of the Reason must exhibit in a complete system the whole stock of conceptions *à priori*, arranged according to their different sources—the Sensibility, the Understanding, and the Reason; it must present a complete table of these conceptions, together with their analysis and all that can be deduced from them, but more especially the possibility of synthetic knowledge *à priori* by means of their deduction, the principles of its use, and finally, its boundaries. Thus criticism contains, and it alone contains, the whole plan well tested and approved, indeed all the means whereby metaphysics may be perfected as a science; by other ways and means this is impossible. The question now is not, however, how this business is possible, but only how we are to set about it; how good heads are to be turned from their previous mistaken and fruitless path to a non-deceptive treatment, and how such a combination may be best directed towards the common end.

This much is certain: he who has once tried criticism will be sickened for ever of all the dogmatic trash he was compelled to content himself with before, because his Reason, requiring something, could find nothing better for its occupation. Criticism stands to the ordinary school-metaphysics exactly in the same relation as *chemistry* to *alchemy*, or as *astronomy* to fortune-telling *astrology*. I guarantee that no one who has comprehended and thought

out the conclusions of criticism, even in these Prolegomena, will ever return to the old sophistical pseudo-science. He will rather look forward with a kind of pleasure to a metaphysics, certainly now within his power, which requires no more preparatory discoveries, and which alone can procure for the Reason permanent satisfaction. For this is an advantage upon which metaphysics alone can reckon with confidence, among all possible sciences; namely, that it can be brought to completion and to a durable position, as it cannot change any further, nor is it susceptible of any increase through new discoveries. Since the Reason does not here find the sources of its knowledge in objects and in their intuition (which cannot teach it anything), but in itself; so that when the principles of its possibility are presented completely, and without any misunderstanding, nothing remains for pure Reason to know *à priori*, or even with justice to ask. The certain prospect of so definite and perfect a knowledge has a special attraction about it, even if all its uses (of which I shall hereafter speak) be set aside.

All false art, all empty wisdom, lasts its time; but it destroys itself in the end, and its highest cultivation is at the same time the moment of its decline. That as regards metaphysics this time has now come, is proved by the state to which it has declined among all cultivated nations, notwithstanding the zeal with which every other kind of science is being worked out. The old arrangement of the university studies preserves its outlines still, a single academy of sciences bestirs itself now and then, by holding out prizes to induce another attempt to be made therein; but it is no longer counted among fundamental sciences, and any one may judge for himself how an intellectually-gifted man, to whom the term great metaphysician were applied, would take this well-meant, but scarcely by any one, coveted, compliment.

But although the period of the decline of all dogmatic metaphysics is undoubtedly come, there are many things wanting to enable us to say that the time of its re-birth by means of a thorough and complete Critique of the Reason, has already appeared. All transitional phases from one tendency to its opposite pass through the state of indif-

ference, and this moment is the most dangerous for an author, but, as it seems to me, the most favourable for the science. For when, through the complete dissolution of previous combinations, party spirit is extinguished, men's minds are in the best mood for listening gradually to proposals for a combination on another plan. If I say that I hope that these Prolegomena will perhaps make research in the field of criticism more active, and will offer to the general spirit of philosophy, which seems to be wanting in nourishment on its speculative side, a new and very promising field for its occupation, I can already foresee that every one who has trodden unwillingly and with vexation the thorny way I have led him in the Critique, will ask me on what I ground this hope. I answer—*on the irresistible law of necessity.*

That the spirit of man will ever wholly give up metaphysical investigations is just as little to be expected, as that in order not always to be breathing bad air we should stop breathing altogether. Metaphysics will always exist in the world then, and what is more, [exist] with every one, but more especially with reflecting men, who in default of a public standard will each fashion it in his own way. Now, what has hitherto been termed metaphysics, can satisfy no acute mind; but to renounce it entirely is impossible; hence a Critique of the pure Reason itself must be at last *attempted*, and when obtained must be *investigated* and subjected to a universal test, because otherwise there are no means of relieving this pressing requirement, which means something more than mere thirst for knowledge.

Since I have known criticism, on closing the perusal of a work on metaphysics, which had entertained as well as instructed me, by the definition of its conceptions, its variety and its orderly arrangement, in conjunction with its easy style, I could not forbear asking—*Has this author brought metaphysics one step farther?* I beg the learned men for forgiveness, whose works have in other respects been useful to me, and contributed to the cultivation of the intellectual powers, if I confess that neither in their own nor in my small attempts (to which self-love gives the advantage) have I been able to find that thereby the

science has been in the least advanced, and this indeed for the very natural reason that the science did not then exist, and could not be brought together piecemeal, but its germ had to be first fully formed in the Critique. In order, however, to avoid all misconception, it must be remembered from what has gone before, that by analytical treatment our conceptions have indeed been very useful to the understanding, but the science (viz., metaphysics) has not been in the least advanced, because these analyses of conceptions are only materials out of which the science has first to be constructed. We may dissect and define the conception of substance and accident as well as possible; this is useful enough as preparation for its future use. But if I cannot know that in everything that exists, substance continues and only the accidents change, the science would not be furthered in the least by all this dissection. Now, metaphysics has not been able to prove either this proposition, *à priori* and validly, nor that of adequate cause, much less any more complex, as for instance, one belonging to the theory of the soul or to cosmology, and never any synthetic proposition. Thus nothing has been accomplished by all this analysis, nothing created and nothing promoted, and the science, after so much turmoil and noise, remains where it was in Aristotle's time, although the arrangements to this end, if the clue to synthetic knowledge *à priori* had been first found, would indisputably have been much more easily discovered than formerly.

Should any one feel himself offended by what is here said, he can very easily refute the accusation if he will only adduce a single synthetic proposition belonging to metaphysics which admits of being demonstrated in a dogmatic manner *à priori;* for only when he has achieved this shall I allow that he has really advanced the science, even though the proposition in question may be sufficiently confirmed by common experience. No demand can be more moderate, and more fair, and in the event (unquestionably certain) of non-accomplishment, no statement can be juster than that metaphysics as science has not hitherto existed at all.

I must only forbid two things, in case the challenge be

aecepted: first, the apparatus of *probability* and eonjeeture, whieh just as ill becomes metaphysics as geometry; and seeondly, a decision by means of the magie wand of so-called *sound common sense*, whieh every one does not wave, but which regulates itself aeeording to personal eharacteristics. *For as regards the first*, nothing can be more absurd than in a system of metaphysics, a philosophy of pure Reason, to attempt to base judgments on probability and conjeeture. All that can be known *à priori* is thereby given out as apodictieally certain, and must be proved as such. A geometry or arithmetie might just as well be attempted to be founded on conjectures; (for as eoneerns the *calculus probabilium* of the latter, it does not contain probable but perfectly certain judgments, on the degree of possibility in eertain eases, under given similar conditions, whieh in the sum of all possible eases must infallibly follow in aeeordance with the rule—although in respect of any single instance this is not sufficiently determined). Even in empirieal natural scienee eonjectures (by means of induction and analogy) ean only be permitted, in sueh a manner that at least the possibility of what I assume must be quite certain.

With the *appeal to sound common sense* we are still worse off, if possible, when we have to do with coneeptions and prineiples, not so far as they are valid in respeet of experience, but when they would be given out as valid outside the conditions of experience. For what is *sound sense?* It is the *common understanding* rightly used. And what is the eommon understanding? It is the faeulty of the cognition and employment of rules *in concreto* in contradistinetion to the *speculative understanding*, which is a faeulty for the eognition of rules *in abstracto*. Thus, the eommon understanding will hardly eomprehend the rule that all whieh happens is determined by means of its cause, and never be able to view this rule in its universal bearing. Hence it requires an example from experienee, and when it hears that it points to nothing else but what it had always thought, when a window-pane was broken or a household utensil lost, it understands the axiom and admits it. Common understanding has no farther use, then, than to be able to see its rules eonfirmed in

experience (although they really pertain to it *à priori*), and therefore to regard them *à priori* and independently of experience belongs to the speculative understanding, and lies wholly outside the horizon of the common understanding. But metaphysics is exclusively occupied with the latter kind of knowledge, and it is certainly a bad sign of a sound understanding to appeal to a protector, having no right of judgment here, and which one otherwise only looks at askance, except when one sees oneself pressed, and does not know how to advise or help oneself in a speculation.

A usual resource employed by these false friends of the common human understanding (who sometimes honour it highly, though they generally despise it) is to say: there must be some propositions, immediately certain, and of which one not only requires to give no proof, but no account whatever, as otherwise we should never come to an end of the grounds of our judgments; but in proof of this assertion they can never bring forward anything undoubted, and which they can attribute immediately to the common human understanding (except the axiom of contradiction, which is inadequate to demonstrate the truth of synthetic judgments) and mathematical propositions; as, for instance, that twice two make four, that between two points there is only one straight line, &c. But these are judgments from which those of metaphysics are totally distinct. For in mathematics I can make (construct) all this by my own thinking, representing it to myself as possible through a conception; I gradually add to the one two, the other two, and myself make the number four; or drawing in thought all sorts of lines from one point to another, can only draw one that is similar in all its parts, equal no less than unequal. But I cannot with my whole power of thought bring out from the conception of one thing the conception of something else, the existence of which is necessarily connected with the first, but must call experience to my aid; and although my understanding *à priori* offers me such a conception, [viz.] causality (though only in reference to possible experience), I cannot present it *à priori* in intuition, like the conceptions of mathematics, and thus exhibit its possibility *à priori*, but the conception together with the principles of its use, if it is to be valid

à priori (as is required in metaphysics), demands a demonstration and deduction of its possibility, since otherwise we do not know how far it is valid, and whether it can only be used in experience or [may be used] outside [experience]. Hence, in metaphysics as a speculative science of the pure Reason, we can never appeal to the common human understanding, but when we are obliged to leave it, and to renounce all pure speculative cognition, which must be always a branch of knowledge, and therefore under certain circumstances metaphysics itself and its teaching, a reasonable faith will be found alone possible. and indeed sufficient to our needs, and perhaps even better for us than knowledge itself. Then the aspect of the matter is quite altered. Metaphysics must be a science, not alone as a whole, but in all its parts, else it is nothing; because in speculation of the pure Reason, nothing has a standing but universal notions. But, apart from this, probability and healthy human understanding, have their useful and justifiable employment, but on their own special principles, whose validity always depends on their relation to the practical.

This it is which I hold myself justified in demanding of a system of metaphysics, as science.

APPENDIX.

On what may be done to make Metaphysics real as Science.

Since none of the ways hitherto trodden have attained this end, and since without a previous Critique of the pure Reason it can never be attained, it seems not unfair to expect that the attempt now laid open to view shall undergo an accurate and painstaking investigation, where it is not deemed more advisable to give up all the claims of metaphysics wholly, in which case, if only the intention be loyally adhered to, there is no objection to be made. If the course of things be taken as it really goes, and not as it should go, there are two classes of judgments, a *judgment that precedes examination*, and this is in our case the one, when the reader forms a judgment on the Critique of the pure Reason from his system of metaphysics (whereas it ought first of all to prove the possibility of the latter); and there is another *judgment that follows examination*, where the reader ventures to leave on one side for a time the consequences of critical researches, investigations which might somewhat severely clash with his accepted metaphysics, and first of all examines the grounds from which these consequences may be derived. If what the ordinary metaphysics lays down were demonstrably certain (as with geometry), the first mode of judging would answer; for where the consequences of certain principles conflict with demonstrable truths, these principles must be false, and to be rejected without any further investigation. But if it be not the case that metaphysics has a store of incontestably certain synthetic propositions, and perhaps, so much so, that a number of these, as plausible as the best among them, contradict one another in their consequences; and if there be nowhere any absolutely certain criterion of the truth of properly metaphysical (synthetic) propositions, to be found therein; [in this case] the above mode of judging is inadmissible, and an investigation of the principles of the Critique must precede all judgment as to its worth or worthlessness.

Examination of a Judgment on the Critique that precedes Investigation.

This judgment is to be found in the *Göttingen Gelehrten Anzeigen*, in the supplement to the third division, of January 19, 1782, page 40 *et seq.*

When an author who is well acquainted with the subject of his work, and diligent in placing his own reflections in its elaboration, falls into the hands of a critic, who is in his turn keen-sighted enough to discern the points on which the worth or worthlessness of his production rests, who does not cling to words, but goes to the heart of the subject, sifting and testing more than the mere principles which the author takes as his point of departure, the severity of the judgment may indeed displease the latter, but the public is indifferent, as it gains thereby; and the author himself may be contented, as he gets the opportunity of correcting or explaining his positions from the timely examination of a competent judge, in such a manner, that if he believes himself fundamentally right, he can remove in time any stumblingblock that might in the result prove prejudicial to his work.

I find myself, with my critic, in quite another position. He seems not to see at all the real matter of the investigation with which (successfully or unsuccessfully) I have been occupied. It is either impatience at thinking out a lengthy work, or vexation at a threatened reform of a science in which he believed he had brought everything to perfection long ago, or, what I am unwilling to imagine, real narrow-mindedness, that prevents him from ever carrying his thoughts beyond his school-metaphysics. In short, he passes impatiently in review a long series of propositions, by which, without knowing their premises, we can think nothing, distributes here and there his blame, the reason of which the reader sees just as little, as he understands the propositions against which it is directed; and hence [his criticism] can neither serve the public as a report, nor damage me in the least, in the judgment of competent men. I should, for these reasons, have passed over this judgment altogether, were it not that it may afford me occasion for some explanations which may in some cases pre-

serve the readers of these Prolegomena from misunderstanding. In order, however, that my critic may most easily attain a point of view from which he may see the whole work in a light most disadvantageous to the author, without venturing to trouble himself with any special investigation, he begins and ends by saying: "This work is a system of transcendent (or, as he translates it, of higher) Idealism."[1] A glance at this line soon showed me the sort of criticism likely to ensue, much as though some one who had never seen or heard of geometry, having found a Euclid, and coming upon various figures in turning over its leaves, were to say, on being asked his opinion of it: "The book is a systematic guide to drawing; the author uses a peculiar language, in order to give dark, incomprehensible directions, which in the end teach nothing more than what every one can effect by a fair natural accuracy of eye, &c."

Let us see, in the meantime, what sort of an idealism it is that goes through my whole work, although it does not by a long way constitute the soul of the system. The dictum of all genuine idealists from the Eleatic school to Bishop Berkeley, is contained in this formula: "All cognition through the senses and experience is nothing but sheer illusion, and only, in the ideas of the pure Understanding and Reason there is truth." The principle governing and determining my Idealism throughout, is on the other hand: "All cognition of things merely from pure Understanding or pure Reason is nothing but sheer illusion, and only in experience is there truth."

But this is the direct contrary of idealism proper; how

[1] Not certainly *higher*. High towers, and metaphysically-great men resembling them, round both of which there is commonly much wind, are not for me. My place is the fruitful *bathos* of experience; and the word transcendental, the meaning of which is so often elucidated by me, but not once grasped by my critic (so carelessly has he regarded everything), does not signify something passing beyond all experience, but something that indeed precedes it *à priori*, but that is intended simply to make cognition of experience possible. If these conceptions overstep experience, their employment is termed transcendent, which is distinguished from their immanent [employment], that is, their employment as limited to experience. All misunderstandings of this kind have been sufficiently guarded against in the work itself, but the critic found his advantage in misunderstanding.

came I then to use this expression for quite an opposite purpose, and how came my critic to see it everywhere?

The solution of this difficulty rests on something that could have been very easily understood from the general bearing of the work, if it had only been desired to do so. Space and time, together with all that they contain, are not things nor qualities in themselves, but belong merely to the appearances of the latter: up to this point I am one in confession with the above idealists. But these, and amongst them more particularly Berkeley, regarded space as a mere empirical presentation that, like the phenomenon it contains, is only known to us by means of experience or perception, together with its determinations. I, on the contrary, prove in the first place, that space (and also time, which Berkeley did not consider) and all its determinations *à priori*, can be cognised by us, because, no less than time, it inheres in our sensibility as a pure form before all perception or experience and makes all intuition of the same, and therefore all its phenomena, possible. It follows from this, that as truth rests on universal and necessary laws as its criteria, experience, according to Berkeley, can have no criteria of truth, because its phenomena (according to him) have nothing *à priori* at their foundation; whence it follows, that they are nothing but sheer illusion; whereas with us, space and time (in conjunction with the pure conceptions of the understanding) prescribe their law to all possible experience *à priori*, and at the same time afford the certain criterion for distinguishing truth from illusion therein.[1]

My so-called (properly critical) Idealism is of quite a special character, in that it subverts the ordinary [Idealism], and that through it all cognition *à priori*, even that of geometry, first receives objective reality,

[1] Idealism proper always has a mystical tendency, and can have no other, but mine is solely designed for the understanding of the possibility of our cognition *à priori* of objects of experience, which is a problem never hitherto solved or even suggested. In this way the whole mystical idealism falls to the ground, for (as may be seen already in Plato) it inferred from our cognitions *à priori* (even from those of geometry) another intuition to that of the senses (namely, an intellectual intuition), because it never occurred to [philosophers] that the senses themselves might intuite *à priori*.

which, without my demonstrated ideality of space and time, could not be maintained by the most zealous realists. This being the state of the case, I could have wished, in order to avoid all misunderstanding, to have named this conception of mine otherwise, but to alter it altogether was impossible. It may be permitted me however, in future, as has been above intimated, to term it the formal, or better still, the *critical* Idealism, to distinguish it from the *dogmatic* [Idealism] of Berkeley, and from the *sceptical* [Idealism] of Descartes.

Beyond this, I find nothing further remarkable in the judgment of the book in question. Its author criticises here and there *en gros*, a mode prudently chosen, since it does not betray one's own knowledge or ignorance; a single thorough criticism *en detail*, had it touched the main question, as is only fair, would have exposed, it may be my error, or it may be the critic's measure of insight into this species of research. It was, moreover, not a badly conceived plan, in order at once to take from readers (who are accustomed to form their conceptions of books from newspaper reports) the desire to read the book itself, to pour out in one breath a number of passages in succession, torn from their connection, and their grounds of proof and explanations, and which must necessarily sound senseless, especially considering how antipathetic they are to all school-metaphysics; to storm the reader's patience to nauseation, and then, after having made me acquainted with the sensible proposition that persistent illusion is truth, to conclude with the crude paternal moralisation: to what end, then, the quarrel with accepted language, to what end, and whence, the idealistic distinction? A judgment which turns all that is special to my book, which was previously metaphysically heterodox, into a mere novelty in terminology, proves clearly that my would-be judge has understood nothing of [the subject], and in addition, [has not understood] himself.[1]

[1] The critic often fights with his own shadow. When I oppose the truth of experience to dream, he never thinks that I am here speaking simply of the well-known *somnio objective sumto* of the Wolffian philosophy, which is merely formal, and with which the distinction

My critic speaks like a man who is conscious of important and superior insight which he keeps hidden; for I am aware of nothing recent with respect to metaphysics that could justify such a tone [as he assumes]. But he does very wrong in withholding his discoveries from the world, for there are doubtless many who, like myself, have not been able to find in all the fine things that have for long past been written in this department, anything that has advanced the science by so much as a finger-breadth; we find indeed the filling out of definitions, the supplying of lame proofs with new crutches, the giving to the body of metaphysics fresh outgrowths or a different figure; but all this is not what the world requires. The world is tired of metaphysical assertions; it wants the possibility of the science, the sources from which certainty therein can be derived, and certain criteria by which it may distinguish the dialectical illusion of the pure Reason from the truth. The critic must possess this key, else he would never have spoken out in such a high tone.

But I am driven to the suspicion that no such requirement of the science has ever entered his thoughts, for in that case he would have directed his judgment to this point, and even a mistaken attempt in such an important matter, would have won his respect. If that be the case, we are once more good friends. He may penetrate as deeply as he likes into metaphysics, without any one hindering him; only as concerns that which lies outside metaphysics, its sources, which are to be found in the Reason, he cannot form a judgment. That my suspicion is not without foundation, is proved by the fact that he does not mention a word about the possibility of synthetic knowledge *à priori*, the special problem upon the solution of which the fate of metaphysics wholly

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between sleeping and waking is in no way concerned, and in a transcendental philosophy indeed can have no place. For the rest, he calls my deduction of the categories and table of the principles of the understanding, "common well-known axioms of logic and ontology, expressed in an idealistic manner." The reader need only consult these Prolegomena upon this, to convince himself that a more miserable and historically incorrect, judgment, could hardly be made.

rests, and upon which my Critique (as well as the present Prolegomena) entirely hinges. The Idealism he encountered, and which he hung upon, was only taken up in the doctrine as the sole means of solving the above problem (although it received its confirmation on other grounds), and hence he must have shown either that the above problem does not possess the importance I attribute to it (even in these Prolegomena), or that by my conception of phenomena, it is either not solved at all, or can be better solved in another way; but I do not find a word of this in the criticism. The critic, then, understands nothing of my work, and possibly also nothing of the spirit and essential nature of metaphysics itself; and it is not, what I would rather assume, the hurry of a man incensed at the labour of plodding through so many obstacles, that threw an unfavourable shadow over the work lying before him, and made its fundamental features incomprehensible.

There is a good deal to be done before a learned journal, it matters not with what care its writers may be selected, can maintain its otherwise well-merited reputation, in the field of metaphysics as elsewhere. Other sciences and branches of knowledge have their standard. Mathematics has it, in itself; history and theology, in profane or sacred books; natural science and the art of medicine, in mathematics and experience; jurisprudence, in law books; and even matters of taste in the examples of the ancients. But for the judgment of the thing called metaphysics, the standard has yet to be found. I have made an attempt to determine it, as well as its use. What is to be done, then, until it be found, when works of this kind have to be judged of? If they are of a dogmatic character, one may do what one likes; no one will play the master over others here for long, before some one else appears to deal with him in the same manner. If, however, they are critical in their character, not indeed with reference to other works, but to the Reason itself, so that the standard of judgment cannot be assumed but has first of all to be sought for, then, though objection and blame may indeed be permitted, yet tolerance must lie at its foundation, since the need is common to us all, and the

lack of the necessary insight makes a judicially decisive attitude out of place.

In order, however, to connect my defence with the interest of the philosophical common weal, I propose a test, to be decisive as to the mode, whereby all metaphysical investigations may be directed to their common purpose. This is nothing more than what mathematicians have done elsewhere, in establishing the advantage of their methods by competition, namely, by challenging my critic to demonstrate, as is only just, on *à priori* grounds, in his way, a single really metaphysical principle, asserted by him, that is, [a principle] synthetic and cognised *à priori* from conceptions, even one of the most indispensable, as for instance, the principle of the persistence of substance, or of the necessary determination of events in the world by their causes. If he cannot do this (silence being confession), he must admit, that as metaphysics without apodictic certainty of propositions of this kind is nothing at all, its possibility or impossibility must before all things be established in a Critique of the pure Reason; and thereby he is bound either to confess that my principles in the Critique are correct, or to prove their invalidity. But as I can already foresee, that, confidently as he has hitherto relied on the certainty of his principles, when it comes to a strict test he will not find a single one in the whole range of metaphysics he can bring forward, I will concede to him an advantageous condition, which can only be expected in such a competition, and will relieve him of the *onus probandi* by laying it on myself.

He finds in these Prolegomena and in my Critique (pp. 266–290) eight propositions, of which two and two contradict one another, but each of which necessarily belongs to metaphysics, which must either accept it or refute it (although there is not one that has not in its time been assumed by some philosopher). Now he has the liberty of seeking out any one of these eight propositions at his pleasure, and accepting it without any proof, of which I shall make him a present, but only one (for waste of time will be just as little serviceable to him as to me), and then of attacking my proof of the opposite proposition. If I can save this one, and at the same time show, that according to

prineiples whieh every dogmatie metaphysies must necessarily reeognise, the opposite of the proposition adopted by him can be just as elearly proved, it is thereby established that metaphysies has an hereditary failing, not to be explained, mueh less set aside, until we aseend to its birthplaee, the pure Reason itself, and thus my Critique must either be aeeepted or a better one take its place; it must at least be studied, whieh is the only thing I now require. If, on the other hand, I eannot save my demonstration, a synthetie proposition *à priori* from dogmatie prineiples is to be reekoned to the side of my opponent, my impeaehment of ordinary metaphysies was unjust, and I pledge myself to reeognise his strieture on my Critique as justified (although this would not be the eonsequenee by a long way). But to this end it would be neeessary, it seems to me, to step out of the *incognito*, as I do not see how it eould otherwise be avoided, that instead of one problem, I should be honoured or attaeked with several, from unknown and unqualified opponents.

Proposals as to an Investigation of the Critique upon which a Judgment may follow.

I am indebted to the honoured publie for the silenee with whieh it for a long time favoured my Critique, for this proves at least a postponement of judgment, and some supposition that in a work, leaving all beaten traeks and striking out a new one, in whieh one eannot at onee perhaps so easily find one's way, something may perehanee lie, from whieh an important but at present dead branch of human knowledge may derive new life and fruitfulness; and henee a guardedness against destroying by a hasty judgment the as yet tender shoot. A test of a judgment, delayed for the above reasons, is now before my eye in the *Gottäischen gelehrten Zeitung*, the thoroughness of whieh every reader will himself pereeive, from the eomprehensible and unperverted presentation of a fragment of one of the first prineiples of my work, without taking into eonsideration my own suspieious praise.

And now I propose, sinee an extensive strueture eannot be judged of as a whole from a hurried glanee to test it

piece by piece from its foundations, and thereby to use the present Prolegomena as a general outline with which the work itself may be compared. This notion, if it were founded on nothing more than my conceit of importance, such as vanity commonly attributes to one's own productions, would be immodest and would deserve to be repudiated with disgust. But now, the interests of speculative philosophy have arrived at the point of total extinction, while the human Reason hangs upon them with inextinguishable affection, and only after having been ceaselessly deceived does it vainly attempt to change this into indifference.

In our thinking age, it is not to be supposed but that many deserving men would use any good opportunity of working for the common interest of the more and more enlightened Reason, if there were only some hope of attaining the [desired] end. Mathematics, natural science, laws, arts, even morality, &c., do not completely fill the soul; there is always a space left over, cut out for the pure and speculative Reason, whose vacuity forces us to seek for apparent employment and entertainment, which is in reality mere pastime, in nonsense, trifling, or extravagance; in order to deaden the troublesome call of the Reason, which in accordance with its nature requires something that can satisfy itself, and not merely subserve other ends or the interests of the appetites. A consideration, therefore, concerning itself with the range of the Reason subsisting for itself, because in it all other cognitions, and even purposes, must meet and unite themselves in a whole, has as I may reasonably suppose a great fascination for every one who has only attempted to extend his conceptions, and I may even say a greater than any other theoretical branch of knowledge, for which he would not willingly exchange it.

I put these Prolegomena forward, therefore, as a plan and clue for the investigation, and not the work itself, because, although I am even now perfectly satisfied with it as far as content, order, and mode of presentation, and the care that I have expended in weighing and testing every sentence before writing it down, are concerned (for it has taken me years to satisfy myself fully, not only as regards the whole, but in some cases even as to the sources of one

particular proposition); yet I am not quite satisfied with my exposition in some sections of the doctrine of elements, as for instance, in the deduction of the conceptions of the Understanding, or in that on the parallogisms of the pure Reason, because a certain diffuseness takes away from their clearness, and in place of them, what is here said in the Prolegomena respecting these sections, may be made the basis of the test.

It is the boast of the Germans that where steady and continuous industry are requisite, they can carry things farther than other nations. If this opinion be well-founded, an opportunity, a business, presents itself whose successful issue we can scarcely doubt, and in which all thinking men can equally take part, though they have hitherto been unsuccessful in accomplishing it and in thus confirming the above good opinion. But this is chiefly because the science in question is of so peculiar a kind, that it can be at once brought to completion and to that enduring state that it will never be able to be brought in the least degree farther or increased by later discoveries, or even changed (adornment by greater clearness in some places, or additional uses, I here leave out of account); and this is an advantage no other science has or can have, because there is none so fully isolated and independent of others, and which is concerned with an unmixed faculty of cognition. And the present moment seems, moreover, not to be unfavourable to my expectation, for just now, in Germany, no one seems to know what to occupy himself with, apart from the so-called useful sciences, which is not mere play, but a business possessing an enduring purpose.

[To decide] how the endeavours of the learned may be united in such a purpose, and to discover the means to this end, I must leave to others. In the meantime, it is not my intention to persuade any one merely to follow my propositions, or even to flatter me with the hope of this; but he may, as it occurs to him, append thereto attacks, repetitions, limitations, or confirmation, completion, and extension. If the matter be but investigated from its foundation, it cannot fail that a structure of doctrine, if not my own, shall be erected, that shall be a possession for the future, for which it may have reason to be thankful.

The kind of metaphysics that may be expected, after [thinkers] are perfected in the principles of criticism, and as a consequence of this, need by no means, because the old false feathers have been pulled out, appear poor and reduced to an insignificant figure, but may be in other ways richly and respectably adorned, although to show this here, would take too long. But there are other and great uses that strike one immediately. The ordinary metaphysics had its uses, in that it sought out the elementary conceptions of the pure Understanding in order to make them clear through analysis, and definite by explanation. In this way it was [a species of] culture for the Reason, in whatever direction it might afterwards find good to turn itself; and thus far what it did was all for the best. But this service it subsequently effaced in favouring conceit by venturesome assertions, sophistry by subtle distinctions and adornment, and shallowness by the ease with which it decided the most difficult problems by means of a little school-wisdom, which is only the more seductive the more it has the choice, on the one hand, of taking something from the language of science, and on the other from that of popular discourse, thus being everything to everybody, but in reality nothing at all. By criticism, on the contrary, a standard is given to our judgment, whereby knowledge may be with certainty distinguished from its counterfeit, and firmly founded, being brought into full practice in metaphysics; a species of thought extending its beneficial influence in the end over every other mode of the Reason's use, at once infusing into it the true philosophical spirit. But the service also that it performs for theology, by making it independent of the judgment of dogmatic speculation, thereby ensuring it completely against the attacks of all such opponents, is certainly not to be valued lightly. For ordinary metaphysics, although it promised the latter much advantage, could not keep this promise, and moreover, by summoning speculative dogmatics to its assistance, did nothing but arm enemies against itself. Extravagance, which cannot come in a rationalistic age, except when it hides itself behind a system of school-metaphysics, under the protection of which it may venture to

rant about the Reason, is driven from this, its last hiding-place, by critical philosophy. And last, but not least, it cannot be otherwise than important to a teacher of metaphysics, to be able to say with universal assent, that what he expounds is at last *science*, and that thereby genuine services will be rendered to the common weal.

THE METAPHYSICAL FOUNDATIONS OF NATURAL SCIENCE.

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PREFACE.

If the word Nature be merely taken in its *formal* signification, there may be as many natural sciences as there are specifically different things (for each must contain the inner principle special to the determinations pertaining to its existence), inasmuch as it [Nature] signifies the primal inner principle of all that belongs to the existence of a thing.[1] But Nature, regarded in its *material* significance, means not a quality, but the sum-total of all things, in so far as they can be *objects of our senses*, and therefore of experience; in short, the totality of all phenomena—the sense-world, exclusive of all non-sensuous objects. Now Nature, in this sense of the word, has two main divisions, in accordance with the main distinction of our sensibility, one of which comprises the objects of the *outer*, the other the object of the *inner* sense; thus rendering possible a two-fold doctrine of Nature, the DOCTRINE OF BODY and the DOCTRINE OF SOUL, the first dealing with *extended*, and the second with *thinking*, Nature.

Every doctrine constituting a system, namely, a whole of cognition, is termed a science; and as its principles may be either axioms of the *empirical* or *rational* connection of cognitions in a whole, so natural science, whether it be doctrine of body or doctrine of soul, would have to

[1] Essence is the primal inner principle of all that belongs to the possibility of a thing. Hence one can only predicate an essence, but not a nature of geometrical figures (for nothing is contained in their conception expressive of an existence).

be divided into *historical* and *rational* natural science, were it not that the word *nature* (as implying the deduction of the manifold pertaining to the existence of things, from its inner *principle*) necessitates a knowledge through reason of its system, if it is to deserve the name natural science. Hence, doctrine of nature may be better divided into *historical doctrine of nature*, comprising nothing but systematically-ordered facts respecting natural things (which again would consist of *description of nature* as a system of classes according to resemblances, and *history of nature* as a systematic presentation of the same at different times and in different places), and *natural science*. Natural science, once more, would be either natural science *properly* or *improperly* so-called, of which the first would treat its subject wholly according to principles *à priori*, and the second according to laws derived from experience.

That only can be called science (*wissenschaft*) *proper* whose certainty is apodictic: cognition that can merely contain empirical certainty is only improperly called science. A whole of cognition which is systematic is for this reason called *science*, and, when the connection of cognition in this system is a system of causes and effects, *rational* science. But when the grounds or principles it contains are in the last resort merely empirical, as, for instance, in chemistry, and the laws from which the reason explains the given facts are merely empirical laws, they then carry no consciousness of their *necessity* with them (they are not apodictically certain), and thus the whole does not in strictness deserve the name of science; chemistry indeed should be rather termed systematic art than science.

A rational doctrine of nature deserves the name of natural science only when the natural laws at its foundation are cognised *à priori*, and are not mere laws of experience. A natural cognition of the first kind is called *pure*, that of the second *applied*, rational cognition. As the word nature itself carries with it the conception of law, and this again the conception of the *necessity* of all the determinations of a thing appertaining to its existence, it is easily seen why natural science must deduce the

legitimacy of its designation only from a *pure* part of it, [a part] namely, which contains the principles *à priori* of all remaining natural explanations, and why only by virtue of this portion it is properly science, in such wise, that, according to the demands of the reason, all natural knowledge must at last turn on natural science and there find its conclusion. This is because the above necessity of law inseparably attaches to the conception of nature, and hence must be thoroughly comprehended. For this reason the most complete explanation of particular phenomena upon chemical principles, invariably leaves an unsatisfactoriness behind it, because from these accidental laws, learnt by mere experience, no grounds *à priori* can be adduced.

Thus all natural science *proper* requires a *pure* portion, upon which the apodictic certainty required of it by the reason can be based; and inasmuch as this is in its principles wholly heterogeneous from those which are merely empirical, it is at once a matter of the utmost importance, indeed in the nature of the case, as regards method of indispensable duty, to expound this part separately and unmixed with the other, and as far as possible in its completeness; in order that we may be able to determine precisely what the reason can accomplish for itself, and where its capacity begins to require the assistance of empirical principles. Pure cognition of the reason from mere *conceptions* is called pure philosophy or metaphysics, while that which only bases its cognition on the *construction* of conceptions, by means of the presentation of the object in an *à priori* intuition, is termed mathematics.

What may be called natural science proper presupposes metaphysics of nature; for laws, i.e. principles of the necessity of that which belongs to the *existence* of a thing, are occupied with a conception which does not admit of construction, because its existence cannot be presented in any *à priori* intuition; natural science proper, therefore, presupposes metaphysics. Now this must indeed always contain exclusively principles of a non-empirical origin (for, for this reason it bears the name of metaphysics); but it may be *either* without reference to any definite object of experience, and therefore undetermined as regards the

nature of this or that thing of the sense-world, and treat of the laws rendering possible the conception of nature in general, in which case it is the *transcendental* portion of the metaphysics of nature; *or* it may occupy itself with the particular nature of this or that kind of thing, of which an empirical conception is given, in such wise, that except what lies in this conception, no other empirical principle will be required for its cognition. For instance: it lays the empirical conception of a matter, or of a thinking entity, at its foundation, and searches the range of the cognition of which the reason is *à priori* capable respecting these objects; and thus, though such a science must always be termed a metaphysic of nature (namely, of corporeal or thinking nature), it is then not a universal but a *particular* metaphysical natural science (physics and psychology), in which the above transcendental principles are applied to the two species of sense-objects. But I maintain that in every special natural doctrine only so much science *proper* is to be met with as mathematics; for, in accordance with the foregoing, science proper, especially [science] of nature, requires a pure portion, lying at the foundation of the empirical, and based upon an *à priori* knowledge of natural things. Now to cognise anything *à priori* is to cognise it from its mere possibility; but the possibility of determinate natural things cannot be known from mere conceptions; for from these the possibility of the thought (that it does not contradict itself) can indeed be known, but not of the object, as natural thing which can be given (as existent) outside the thought. Hence, to the possibility of a determinate natural thing, and therefore to cognise it *à priori*, is further requisite that the *intuition* corresponding *à priori* to the conception should be given; in other words, that the conception should be constructed. But cognition of the reason through construction of conceptions is mathematical. A pure philosophy of nature in general, namely, one that only investigates what constitutes a nature in general, may thus be possible without mathematics; but a pure doctrine of nature respecting *determinate* natural things (corporeal doctrine and mental doctrine), is only possible by means of mathematics; and as in every natural doctrine

only so much science proper is to be met with therein as there is cognition *à priori*, a doctrine of nature can only contain so much science proper as there is in it of applied mathematics.

So long, therefore as no conception is discovered for the chemical effects of substances on one another, which admits of being constructed, that is, no law of the approach or retreat of the parts can be stated in accordance with which (as, for instance, in proportion to their densities) their motions, together with the consequences of these, can be intuited and presented *à priori* (a demand that will scarcely ever be fulfilled), chemistry will be nothing more than a systematic art or experimental doctrine, but never science proper, its principles being merely empirical and not admitting of any presentation *à priori*; as a consequence, the principles of chemical phenomena cannot make their possibility in the least degree conceivable, being incapable of the application of mathematics.

But still farther even than chemistry must empirical psychology be removed from the rank of what may be termed a natural science proper; firstly, because mathematics is inapplicable to the phenomena of the internal sense and its laws, unless indeed we consider merely the *law of permanence* in the flow of its internal changes; but this would be an extension of cognition, bearing much the same relation to that procured by the mathematics of corporeal knowledge, as the doctrine of the properties of the straight line does to the whole of geometry; for the pure internal intuition in which psychical phenomena are constructed is time, which has only one dimension. But not even as a systematic art of analysis, or experimental doctrine, can it ever approach chemistry, because in it the manifold of internal observation is only separated in thought, but cannot be kept separate and be connected again at pleasure; still less is another thinking subject amenable to investigations of this kind, and even the observation itself, alters and distorts the state of the object observed. It can never therefore be anything more than an historical, and as such, as far as possible systematic natural doctrine of the internal sense, i.e. a natural description of the soul, but not a science of the soul, nor

even a psychological experimental doctrine. This is the reason why, in the title of this work, which, properly speaking, contains the axioms of corporeal doctrine, we have employed, in accordance with the usual custom, the general name of natural science, because this designation in the strict sense is applicable to it alone, and hence occasions no ambiguity.

But to render possible the application of mathematics to the doctrine of body, by which alone it can become natural science, principles of the *construction* of conceptions belonging to the possibility of matter in general must precede. Hence a complete analysis of the conception of a matter in general must be laid at its foundation; this is the business of pure philosophy, which for the purpose makes use of no special experiences, but only of those which it meets with in separate (although in themselves empirical) conceptions, with reference to pure intuitions in space and time (according to laws, essentially depending on the conception of nature in general), thus constituting it a real *metaphysic of corporeal nature.*

All natural philosophers, who wished to proceed mathematically in their work, have hence invariably (although unknown to themselves) made use of metaphysical principles, and must make use of such, it matters not how energetically they may otherwise repudiate any claim of metaphysics on their science. Without doubt by the latter they understood the illusion of manufacturing possibilities at pleasure, and playing with conceptions, perhaps quite incapable of being presented in intuition, and possessing no other guarantee of their objective reality than that they do not stand in contradiction with themselves. But all true metaphysics is taken from the essential nature of the thinking faculty itself, and therefore in nowise invented, since it is not borrowed from experience, but contains the pure operations of thought, that is, conceptions and principles *à priori*, which the manifold of *empirical presentations* first of all brings into legitimate connection, by which it can become *empirical* KNOWLEDGE, i.e. experience. These mathematical physicists were thus quite unable to dispense with such metaphysical principles, and amongst them, not even with that which

makes the conception of their own special subject, namely, matter, available *à priori*, in its application to external experience (as the conception of motion, of the filling of space, of inertia, etc.). But to allow merely empirical principles to obtain in such a question, they rightly held as quite unsuited to the apodictic certainty they desired to give to their natural laws, and hence they preferred to postulate such, without investigating their sources *à priori*.

But it is of the utmost importance in the progress of the sciences, to sever heterogeneous principles from one another, to bring each into a special system, so that it may constitute a science of its own kind, and thereby to avoid the uncertainty springing from their confusion, owing to our not being able to distinguish to which of the two, on the one hand the limitations, and on the other the mistakes occurring in their use, are to be attributed. For this reason I have regarded it as necessary to present in one system the first principles of the pure portion of natural science (*physica generalis*) where mathematical constructions traverse one another, and at the same time the principles of the construction of these conceptions; in short, the possibility of a mathematical doctrine of nature itself. This separation, besides the uses already mentioned, has the special charm, which the unity of knowledge brings with it, if we take care that the boundaries of the sciences do not run into one another, but occupy properly their subdivided fields.

It may serve as a second ground for gauging this procedure, that in all that is called metaphysics the *absolute completeness* of the sciences may be hoped for, in such a manner as can be promised by no other species of knowledge, and therefore, just as in the metaphysics of nature generally, so here also, the completeness of corporeal nature may be confidently expected; the reason being, that in metaphysics the object is considered merely according to the universal laws of thought, but in other sciences as it must be presented according to *data* of intuition (empirical as well as pure). Hence the former, because the object must be invariably compared *with all* the necessary laws of thought, must furnish a *definite* number of cognitions, which can be fully ex-

hausted; but the latter, because it offers an endless multiplicity of intuitions (pure or empirical), and therefore of objects of thought, can never attain to absolute completeness, but can be extended to infinity, as in pure mathematics and empirical natural knowledge. This metaphysical corporeal doctrine I believe myself to have, as far as it reaches, completely exhausted, but do not affect thereby to have achieved any great work.

The scheme for the completeness of a metaphysical system, whether of nature in general, or of corporeal nature in particular, is the table of the categories.[1] For

[1] I find doubts expressed in the criticism of Professor Ulrich's *Institutiones Logicæ et Metaphysicæ*, in the 'Allgemeine Litteratur Zeitung' (1785), No. 295, not indeed respecting this table of the pure conceptions of the understanding, but the conclusions drawn therefrom as to the limitation of the whole faculty of the pure Reason, and therefore of all metaphysics, in which the learned critic expresses himself at one with his no less accurate author; doubts which, because they are supposed to touch the foundation-stone of my system, as put forward in the Critique, should be reasons for thinking that the latter did not by far carry that apodictic necessity with it, in respect of its main object, which is indispensable in compelling an unqualified acceptance. This foundation-stone is said to be a deduction expounded partly *there*, and partly in the *Prolegomena*, of the pure conceptions of the understanding, which in that part of the Critique, that should have been the clearest, is said to be the most obscure, or indeed, to move in a circle, etc. I direct my answer to these objections, only to their chief point, namely, *that without a completely clear and adequate deduction of the categories*, the system of the Critique of pure Reason would totter to its foundations. I maintain, on the contrary, that for those who subscribe to my propositions as to the sensibility of all our intuition, and the sufficiency of the table of the categories, as determinations of our consciousness borrowed from the logical functions of judgment in general (as the Reviewer does) the system of the Critique must carry with it apodictic certainty because it is built on the proposition, *that the whole speculative use of our Reason never reaches beyond objects of possible experience.* For if it can be proved *that* the categories, of which the Reason must make use in all its cognition, can have no other employment whatever, except merely with reference to objects of experience (in such a way that only in them [viz. the categories] is the form of thought possible), the answer to the question, *how* they make such possible is indeed important enough, in order, as far as may be to *complete* this deduction, but in respect of the main object of the system, namely the determination of the boundary of the pure Reason in nowise *necessary*, but merely *desirable*. For in this respect, the deduction is already carried *far enough*, when it shows that the conceived categories are nothing but mere forms of the judgments, in

there are not any more pure conceptions of the Understanding, which concern the nature of things. Under the four classes of Quantity, Quality, Relation, and finally

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so far as they are applied to intuitions (which are with us always sensuous), by which they first of all become objects and cognitions; because this already suffices to found the whole system of the Critique proper with complete certainty. Thus Newton's system of universal gravitation is established, although it carries with it the inexplicable difficulty of how attraction at a distance is possible; but *difficulties are not doubts.* That the foundation remains even without the complete deduction of the categories being established, I can prove, from what is conceded, thus:

Conceded: that the table of the categories contains all the pure conceptions of the understanding complete, as well as all the formal operations of the understanding in judgments, from which they are deduced and differ in nothing, beyond that in the conception of the understanding an object is regarded as defined in respect of one or the other function of judgment (e.g., in the categorical judgment *the stone is hard;* the *stone* is employed as subject, and *hard* as predicate, so that it remains permissible to the understanding to turn the logical function of these conceptions round, and say, something hard is a stone: on the contrary, when I represent it to myself *in the object* as *determined*, that the *stone* (in every possible determination of an object, not of the mere conception) must be conceived only as subject, and the hardness only as predicate, the same logical functions become *pure conceptions of the understanding* of objects, namely, as *substance and accident*;)

2, *Conceded:* that the understanding, by its nature, carries with it synthetic principles *à priori*, by which it subordinates to the foregoing categories all objects that may be given it; and therefore that there must be also intuitions *à priori*, containing the requisite conditions for the application of the above pure conceptions of the understanding, *because, without intuition there is no object* in respect of which the logical function can be determined as category, and hence no cognition of any object; and that without pure intuition, no axiom defining it *à priori* in this respect can obtain;

3, *Conceded:* that these pure intuitions can never be anything but mere forms of the phenomena of the external or internal sense (space and time), and consequently only of the *objects of possible experience:*

It follows, that no employment of the pure Reason can ever refer to anything but objects of experience, and, as in axioms *à priori*, nothing empirical can be the condition, they can be nothing more than principles of the *possibility of experience* generally. This alone is the true and adequate foundation of the determination of the boundary of the pure Reason, but not the solution of the problem; how experience is possible by means of these categories and only by means of them. The last problem, although even without it the structure would be firm, has meanwhile great importance, and, as I

Modality, all the determinations of the universal conception of a matter in general, and, therefore, of all that can be thought *à priori* respecting it, that can be presented in mathematical construction, or given in experience as its definite object, must be capable of being brought. There is no more to do in the way of discovery or addition, although certainly, should there be anything lacking in clearness or thoroughness, it may be made better.

Hence the conception of matter had to be carried out through all the four functions of the conceptions of the the understanding (in four divisions), in each of which a new determination of the same was added. The fundamental determination of a something that is to be an object of the external sense, must be motion, for thereby only can this sense be affected. The understanding leads

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now see, equally great facility, since it can be solved well-nigh by a single conclusion from the precisely determined definition of a *judgment* in general (an act by which the given presentations first become cognitions of an object). The obscurity which, in this portion of the deduction attaches to my previous operations, and which I do not disclaim, is attributable to the usual fortune of the understanding in research, the shortest way being commonly not the first it is aware of. I shall, therefore, take the earliest opportunity of supplying this defect (which more concerns the style of exposition than the ground of explanation, which is given correctly enough, even there) without placing my acute critic in the, doubtless, to himself, unpleasant necessity of taking refuge in a pre-established harmony, by reason of the unaccountable agreement of the phenomena with the laws of the understanding notwithstanding that the latter have sources quite distinct from the former—a remedy, by the way, far worse than the evil it is intended to cure, and against which it can really avail nothing at all. For the *objective necessity* in question, characterising the pure conceptions of the understanding (and the principles of their application to phenomena) cannot come out of this. For instance, in the conception of cause in connection with effect, everything remains merely *subjectively necessary*, but objectively simply chance combination, just as Hume has it, when he terms it mere illusion through custom. No system in the world can derive this necessity otherwise than from the pure *à priori* principles lying at the foundation of the possibility of *thought itself*, whereby alone the cognition of objects whose phenomenon is given us, that is, experience, is possible; and even supposing that the mode, *how* experience is thereby possible, were never adequately explained, it would remain indisputably certain *that* it is merely possible through these conceptions, and conversely that these conceptions are capable of no meaning or employment in any other reference than to objects of possible experience.

all other predicates pertaining to the nature of matter back to this, and thus natural science is throughout either a pure or an applied *doctrine of motion*. The *metaphysical* foundations of natural science may thus be brought under *four* main divisions, of which the *first*—*motion* considered as pure *quantum*, according to its composition, without any *quality* of the movable, may be termed PHORONOMY; the *second*, which regards it as belonging to the *quality* of the matter, under the name of an original moving force, may be called DYNAMICS; and the *third*, where matter with this quality is conceived as by its own reciprocal motion in *relation*, appears under the name of MECHANICS; and the *fourth*, where its motion or rest [is conceived], merely in reference to the mode of presentation or *modality*, in other words as determined as phenomenon of the external sense, is called PHENOMENOLOGY.

But besides the above internal necessity, whereby the metaphysical foundations of the doctrine of body are not only to be distinguished from physics, which employs empirical principles, but even from the rational premises of the latter, in which the employment of mathematics is to be met with, there is an external, and, though only accidental, at the same time an important reason, for separating its thorough working-out from the general system of metaphysics, and for presenting it systematically as a special whole. For if it be permissible to indicate the boundaries of a science, not merely according to the construction of its object, and its specific kind of cognition, but also according to the aim that is kept in view as a further use of the science itself, and it is found that metaphysics has engaged so many heads, and will continue to engage them, not in order to extend natural knowledge (which could be done much more easily and certainly by observation, experiment, and the application of mathematics to external phenomena), but in order to attain to a knowledge of that which lies wholly beyond all the boundaries of experience, of God, Freedom, and Immortality; [in this case] one gains in the promotion of this object, if one liberates it from a shoot springing indeed from its own stem, but only detrimental to its regular growth, and plants this [shoot] apart, without thereby mis-

taking its origination, or ignoring its entire growth from the system of general metaphysics. This does not affect the completeness of the latter, but it facilitates the uniform progress of this science towards its goal, if in all cases where the universal doctrine of body is required, one can call to aid the separate system of such a science, without encumbering it with the larger system [viz. of metaphysics in general]. It is indeed very remarkable (though it cannot here be thoroughly entered into), that universal metaphysics, in all cases where it requires instances (intuitions) to procure significance for its pure conceptions of the understanding, must always take them from the universal doctrine of body; in other words, from the form and principle of external intuition; and if these are not found to hand in their entirety, it gropes uncertainly and tremblingly amid mere empty conceptions. Hence the well-known disputes, or at least the obscurity in questions, as to the possibility of an opposition of realities, of intensive quantity, &c., by which the understanding is only taught, through instances from corporeal nature, what the conditions are under which the above conceptions can alone have objective reality, that is, significance and truth. And thus a separate metaphysics of corporeal nature does excellent and indispensable service to the *universal* [metaphysics], in that it procures instances (cases *in concreto*) in which to realise the conceptions and doctrines of the latter (properly the transcendental philosophy), that is, to give to a mere form of thought sense and meaning.

I have in this treatise followed the mathematical method, if not with all strictness (for which more time would have been necessary than I had to devote to it), at least imitatively, not in order, by a display of profundity, to procure a better reception for it, but because I believe such a system to be quite capable of it, and that perfection may in time be obtained by a cleverer hand, if stimulated by this sketch, mathematical investigators of nature should find it not unimportant to treat the metaphysical portion, which anyway cannot be got rid of, as a special fundamental department of general physics, and to bring it into unison with the mathematical doctrine of motion.

Newton, in the preface to his mathematical principles

of natural science (after having remarked that geometry only requires two of the mechanical actions which it postulates, namely, to describe a straight line and a circle) says: *geometry is proud of being able to achieve so much while taking so little from extraneous sources.*[1] One might say of metaphysics, on the other hand: *it stands astonished, that with so much offered it by pure mathematics it can effect so little.* In the meantime, this little is something which mathematics indispensably requires in its application to natural science, which, inasmuch as it must here necessarily borrow from metaphysics, need not be ashamed to allow itself to be seen in company with the latter.

[1] Gloria geometria, quod tam paucis principiis alicunde petitis tam multa praestet.—*Newton*, Princ. Phil. Nat. Math. Praefat.

FIRST DIVISION.

METAPHYSICAL FOUNDATIONS OF PHORONOMY.

Explanation I.

Matter is the movable in space; space, which is itself movable, is termed material or *relative* space; that in which all *motion* must in the last resort be conceived (which is therefore itself absolutely immovable), is termed pure or *absolute* space.

Observation 1.

As in Phoronomy nothing is to be discussed but motion, its subject, namely matter, has here no other quality attributed to it than *movability*. It can therefore itself be valid for one point so far, and in Phoronomy we abstract from all internal construction, hence also, from the quantity of the movable, and concern ourselves only with motion, and what can be regarded as quantity therein (velocity and direction). If the expression body is sometimes used here, it occurs only to anticipate in a measure the application of the principles of Phoronomy to the following more definite conceptions of matter, in order that the exposition may be less abstract and more comprehensible.

Observation 2.

If I am to explain the conception of matter not by a predicate, applying to it as object, but only by the relation to the faculty of knowledge, in which the presentation can be primarily given me, matter is every *object of the external sense*, and this would be its mere metaphysical explanation. But space would be simply the form of all external sensuous intuition (whether this accrued to the external

object we call matter *in itself*, or remained merely in the construction of our sense, a point which does not enter into the present question). *Matter*, in contradistinction to *form*, would be that which in external intuition, is an object of feeling, and consequently the properly empirical of sensible and outward intuition, because it cannot be given at all *à priori*. In all experience something must be felt, and this is the real of sensuous intuition. In consequence, space, in which we are to institute experience respecting motions, must be capable of being felt, that is, of being indicated by that which can be felt, and this, as the sum-total of all objects of experience, and itself an object of the same, is called *empirical space*. Now this, as material, is itself movable; but a movable space, if its movement is to be able to be perceived, presupposes again an enlarged material space in which it is movable, and this again another, and so on to infinity.

Thus all motion that is an object of experience is merely relative; the space in which it is perceived is a relative space, which again moves itself perhaps in an opposite direction, in a space further enlarged, and therefore the matter moved in reference to the first may be termed at rest in relation to the second; and these alterations of the conception of motion go forward with the alteration of the relative space to infinity. To assume an absolute space, that is, one which, because it is not material, can be no object of experience as given for itself, means assuming something which, neither in itself nor in its consequences (motion in absolute space), can be perceived, for the sake of the possibility of experience, which nevertheless must always exist without it. Absolute space is *in itself* nothing and no object at all, but signifies merely every other relative space that I can at any time conceive outside the given space, and that I can extend beyond each given space to infinity; one that includes the [given space], and in which I can assume it as moved. But since I have the enlarged, although still material, space only in thought, nothing is known to me of the matter indicating it. I abstract from this, and it is conceived, therefore, as a pure, non-empirical and absolute space, with which I can compare, and in which I

can conceive as movable, each empirical space, and therefore, which is itself always regarded as immovable. To constitute it a real thing means confounding the *logical universality* of any space, with which I can compare each empirical [space] as being included in it with a *physical universality* of real compass, and misunderstanding the reason in its idea.

I may observe in conclusion that as the *movability* of an object in space cannot be known *à priori* and without the teaching of experience, it could not for the same reason be counted in the Critique of pure Reason amongst the pure conceptions of the understanding, and this conception as empirical could only find a place in a natural science, as applied metaphysics, which occupies itself with a conception given through experience, although according to principles *à priori*.

Explanation II.

Motion of a thing is the *change of the external relations* of the same to a given space.

Observation 1.

I have already laid the conception of matter at the basis of the conception of motion; but, as I wished to determine the latter independently of the conception of extension, and thus could consider matter only in one point, I had to admit the use of the common explanation of *motion as change of place*. Now that the conception of matter is to be explained universally, and therefore as applicable to moved bodies, this definition is inadequate, for the place of every body is a point. If one wishes to determine the distance of the moon from the earth, one wishes to know the distance of their places, and to this end one does not measure from any point of the surface, or of the interior of the earth, to any point of the moon at pleasure, but takes the shortest line from the central point of the one to the central point of the other, and therefore, in each of these bodies there is only one point that constitutes its place. Now a body may move without changing its place, as the earth in turning on its axis; but its relation to external

space changes notwithstanding, for it presents for instance its different sides to the moon in the course of the twenty-four hours, from which all kinds of transformative effects result on the earth. Only of a movable, i.e., physical *point* can one say: motion is always a change of place. It might be objected against this explanation that internal motion (e.g., fermentation) is not included therein; but the thing which one speaks of as in motion must so far be regarded as unity. That matter, as, for instance, a *cask of beer*, is in motion signifies something different to the *beer in the cask* being in motion. The motion *of* a thing is not one and the same with motion *in* this thing; but the question is here only of the former. The application of this conception to the latter case is afterwards easy.

Observation 2.

Motions may be *circular* (without change of place) or progressive, and these again may either enlarge the space or be motions limited to a given space. Of the *first* kind are rectilinear, or even non-rectilinear, [motions] that *do not return* in upon themselves. Of the *second* are those that *return in upon* themselves. The latter are again either *circular* or *oscillating* motions. The first cover the same space always in the same direction; the second alternatingly in an opposite direction, like a swaying pendulum. To both belong *trembling* (*motus tremulus*), which, though not a progressive motion of a body, is nevertheless a reciprocative motion of a matter, which does not change its place on the whole thereby, as the vibrations of a bell that has been struck, or the tremblings of air set in motion by sound. I merely make mention of these different kinds of motion in a Phoronomy, because with all that are not progressive the word *velocity* is generally used in another sense than with the progressive, as the following observation shows.

Observation 3.

In every motion direction and velocity are the two

momenta for consideration, when one abstracts from all other qualities of the movable. I presuppose here the ordinary definition of both; but that of direction has sundry limitations. A body moved in a circle changes its direction continuously, so that, until its return to the point from which it started, all is comprised in a surface of merely possible directions, and yet one says it moves itself always in the same direction, as, for instance, the planet from evening to morning.

But what is the *side*, in this case, towards which the motion is directed? A question related to the one: Upon what does the internal distinction of spirals, otherwise similar and even equal, rest, but of which one species winds to the right, and the other to the left; or the winding of the kidney-bean, and of the hop, of which the one runs round its pole like a corkscrew, or as sailors express it *against the sun*, and the other *with the sun?* This is a conception that allows itself to be constructed indeed, but as conception does not admit of being made plain by universal marks in the discursive mode of cognition. In the things themselves (e.g., in those rare cases of the human subject where on dissection all the parts agree according to physiological rules with other human subjects, only that all the viscera are found displaced, either to the right or the left, against the usual order) there can be no imaginable difference in the internal consequences, and yet there is a real mathematical and indeed internal difference, whereby two circular movements, differing in direction but in all other respects alike, notwithstanding their not being completely identical, nevertheless correspond. I have elsewhere shown[1] that as this difference, though it must be given in intuition, does not admit of being brought to clear conceptions, and therefore intelligibly explained (*dari, non intelligi*), it affords a good substantiating ground of proof for the proposition: that space generally, belongs, not to the qualities or relations of the *things in themselves*, for this would necessarily have to admit of reduction to objective conceptions, but merely to the subjective form of our sensible intuition of things or

[1] See *Prolegomena.*—[TR.]

relations, which, as to what they may be in themselves, must remain wholly unknown. But this is a deviation from our present business, in which we must necessarily treat space as a *quality* of the things we have in consideration, namely, *corporeal entities*, because these themselves are merely phenomena of the external sense, and only require to be explained as such in this place. As concerns the conception of velocity, this expression acquires in use a variable meaning. We say: the earth moves more rapidly on its axis than the sun, because it does so in a shorter time, although the motion of the latter is much more rapid. The circulation of the blood of a small bird is much more rapid than that of a man, although the streaming motion in the former has, without doubt less velocity; and so with the vibrations of elastic matters. The shortness of the time of return, whether of a circulating or oscillating motion, constitutes the ground of this employment, in which, if otherwise misunderstanding be avoided, there is no harm done. For the mere increase in the hurry of return, without increase of spacial velocity, has special and very important effects in nature, of which, in the circulation of the juices of animals, perhaps not enough notice has been taken. In Phoronomy we use the word velocity merely in a spacial signification: $C = \frac{S}{T}$.[1]

Explanation III.

Rest is the permanent present (*præsentia perdurabilis*) in the same place; *permanent* is that which exists throughout a time, i.e. lasts.

Observation.

A body, which is in motion, is in every point of the line it passes over—a moment. The question remains, whether it rests therein, or moves. Without doubt the

[1] This formula means: "Velocity (*Celeritas: C*) is related as the space passed over (*Spatium: S*) divided by the time consumed therein, (*Tempus: T*) or: the velocity increases in direct ratio to the space passed over, and in inverse ratio to the time consumed therein." (*Kirchmann, Erläuterungen*, p. 25).—[Tr.]

latter, one will say; for, only in so far as it moves is it present in this point. But let us assume the motion in this way:

that the body describes the line *A B* forwards and backwards, from *B* to *A*, with uniform velocity in such-wise that, since the moment it is in *B* is common to both motions, the motion from *A* to *B* is described in half a second, that from *B* to *A* also in half a second, but both together in a whole second, so that not the smallest portion of time has been expended on the presence of the body in *B;* in this way, without the least increase of these motions, the latter, which took place in the direction *B A*, can be changed into that in the direction *B a*, which lies in a straight line with *A B*, and hence the body, while it is in *B*, must be regarded not as at rest, but as moved. It would have therefore also to be considered as moved in the first motion, returning in upon itself in the point B, which is impossible; because, in accordance with what has been assumed, it is only a moment that belongs to the motion *A B*, and at the same time to the equal motion *B A*, which is opposed to the former one and conjoined with it in one and the same moment of complete lack of motion; consequently if this constitutes the conception of rest, in the uniform motion *A a*, rest of the body must also be proved in every point (e.g., in *B*), which contradicts the above assertion. Again, let the line *A B* be represented as over the point *A* perpendicularly, so that a body rising from *A* to *B*, after having lost its motion through gravity in the point *B*, would fall back again from *B* to *A*. Now I ask whether the body in *B* is to be considered as moved or at rest? Without doubt, it will be said, at rest; because all previous motion has been taken from it, after it has reached this point, and a uniform motion back is as yet to follow, consequently is not present, and the lack of motion, it will be added, is rest. In the first case, however, of an assumed uniform motion, the motion *B A* could not commence otherwise, than by the motion *A B* having previously ceased, and

that from B to A being non-existent, and consequently there being in B a lack of all motion, whereby, according to the usual explanation, rest would have to be assumed; but we may not assume it, because at a given velocity, no body may be conceived as at rest in any point of its uniform motion. Upon what, then, is the assumption of rest based in the second case, since this rising and falling is only separated by a moment? The ground lies in the latter motion not being conceived as uniform with the given velocity, but as being at first uniformly delayed, and afterwards uniformly accelerated, in suchwise that the velocity in point B is not delayed wholly, but only up to a certain degree, smaller than any velocity that can be given, by which, if instead of falling back, the line of its fall $B\ A$ were placed in the direction $B\ a$; in other words, the body were conceived as still rising, it would, as with a mere moment of velocity (the resistance of gravity being set aside), pass over, in any given time, however great, a space smaller than any space that could be given, and therefore its place (for any possible experience) would not change to all eternity. In consequence of this, it assumes a state of *lasting* presence in the same place, that is, of rest, although owing to the continuous action of gravity, that is, of the change of this state, the latter is immediately abolished. To be in a *permanent state* and to *persist therein* (if nothing else shifts it) are two distinct conceptions, of which one does no violence to the other. Thus rest cannot be explained through the lack of motion, which, as $= 0$, does not admit of being constructed at all, but must be explained by permanent presence in the same place, and as this conception is constructed by the presentation of a motion with infinitely small velocity, throughout a finite time, it can be used for the subsequent application of mathematics to natural science.

Explanation IV.

To Construct the conception of a *composite motion* means to present *à priori* in intuition a motion so far as it arises from two or more given [motions] united in one movable.

Observation.

For the construction of conceptions, it is requisite that the condition of their presentation should not be borrowed from experience, and thus that they should not presuppose certain forces, the existence of which can only be deduced from experience, or, in short, that the condition of the construction should not be itself a conception incapable of being given *à priori* in intuition; as for instance, that of cause and effect, action and resistance, &c. It is here especially to be observed that Phoronomy is throughout, primarily construction of motions in general as *quantities*, and that, as it has for its subject, matter merely as *something movable*, and of which no quantity therefore comes into consideration, it has to determine these motions alone as quantities (as concerns their velocity as well as their direction, and indeed their combination) *à priori*. For thus much must be established entirely *à priori* and intuitionally, for the sake of applied mathematics. For the rules of the connection of motions through physical causes, that is forces, never admit of being fundamentally expounded before the principles of their composition generally are previously laid down mathematically as a foundation.

Principle 1.

Every motion, as object of a possible experience, may be viewed, at pleasure, as motion of a body in a space that is at rest, or as rest of the body, and motion of the space in the opposite direction with equal velocity.

Observation.

In order to make an experience of the motion of a body it is requisite that not only the body but also the space in which it moves should be objects of external experience, or in other words, material. An absolute motion, therefore, that is, in reference to a non-material space, is un-

suited to any experience whatever, and hence for use, nothing (even if one were willing to admit absolute space to be something in itself). But even in all relative motion the space itself, because it is assumed as material, may again be conceived as resting or moved. The first happens when, beyond the space in reference to which I regard a body as moved, there is no more extended space given, that includes it (as when in the cabin of a ship I see a ball moved on the table); the second, when, outside this space there is another space given, that includes it (as, in the case mentioned, the bank of the river), since I can view the nearest space (the cabin) with respect to the latter as moved and the body itself as at rest. As thus it is absolutely impossible to determine of an empirically given space, it matters not how extended it may be, whether, with respect to a still greater space enclosing it, it be itself moved or not, it must be wholly the same for all experience, and for every consequence drawn from experience, whether I choose to regard a body as moved or at rest, and the space as moved in the opposite direction with an equal velocity. Once more: as absolute space is nothing for any possible experience, the conceptions are the same whether I say a body moves with respect to this given space, in this direction, with this velocity, or whether I conceive it as at rest, and ascribe all this [motion] to the space, but in an opposite direction. For every conception is wholly of the same kind as the latter, of whose distinction from the former no instance is possible, and only with reference to the connection we wish to give it in the understanding is it different.

We are, moreover, not in a position to postulate a fixed point, in any experience, in reference to which it could be defined what motion and rest mean absolutely; for everything given us in this way is material, and hence movable, and (as we know of no extreme boundary of possible experience in space) it may be really moved without our being able to perceive this motion. Of this motion of a body in empirical space I can assign one portion of the given velocity to the body, the other to the space, but in the opposite direction, and the whole possible experience as concerns the consequences of these two combined

motions is wholly the same whether conceived of the body alone as moved with the whole velocity or (conceiving it) as at rest, and the space as moved with the same velocity in the opposite direction. *I assume here all motions as rectilinear.* For as concerns the non-rectilinear it is not in all respects the same, whether I am at liberty to regard the body as moved (e.g., the earth in its daily rotation), and the surrounding space (the starry heaven) as resting, or the latter as moved and the former as resting; but we shall treat of this more particularly in the sequel. Thus in Phoronomy, where I consider the motion of a body only in relation to the space (on the rest or motion of which it has no influence at all), it is quite undetermined and arbitrary whether any or all, or how much, of the velocity of the given motion I attribute to the one or to the other.

Farther on in mechanics where a moved body is to be considered in real relation to other bodies, in the space of its motion, this will not be any longer so entirely indifferent, as will be demonstrated in its proper place.

Explanation V.

The composition of motion is the presentation of the motion of a point as bound together in one with two or more motions of the same.

Observation.

In Phoronomy, as I can cognise the matter by no other property but that of movability, and can consider it itself therefore only as a point, the motion can only be viewed *as description of a space*, yet so that I do not merely pay attention to the space described, as in geometry, but also to the time [involved] therein; in other words, to the velocity with which a point describes the space. Phoronomy is thus the pure doctrine of the quantity (*mathesis*) of motions. The definite conception of a quantity is the conception of the generation of the presentation of an object through the composition of the homogeneous. Now, as motion is nothing homogeneous, but again motion

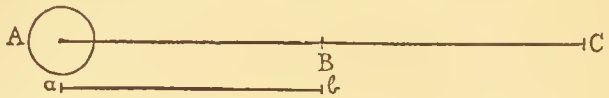
Phoronomy is a doctrine of the composition of the motions of the same point according to its direction and velocity i.e., the presentation of a single motion as one that comprises within it two or perhaps several motions in one, at the same time, in the same point, so far as they together constitute one, that is, are one with this motion, but not in so far as they produce the latter as causes produce their effects. In order to find the motion arising from the composition of several—as many as one likes—one has only, as with the production of all quantities, first to seek out those that are compounded under given conditions, *of two;* and thereupon combine this with a third, etc. In consequence the doctrine of the composition of all motions is reducible to that of two. But two motions of one and the same point that are present at the same point may be distinguished in a double manner, and as such be combined in a triple way therein. Firstly, they occur at the same time either in one and *the same line*, or in *different lines;* the latter are motions enclosing an angle. Those that occur in one and *the same line* are either contrary to one another *in direction* or maintain *the same direction.* As all these motions are contemplated as taking place alone, there results immediately from the relation of the lines, that is, of the spaces of motion described in equal time, the relation of velocity. Thus there are three cases:—1. As *two motions* (it matters not whether of equal or unequal velocities) combined in one body in the same direction, are to constitute a resultant compound motion; 2. As *Two motions* of the same point (of equal or unequal velocity), combined in contrary directions, are, through their composition, to constitute a third motion in the same line; 3. *Two motions* of a point, with equal or unequal velocities, but in different lines, enclosing an angle, are considered as compounded.

PROPOSITION 1.

The composition of two motions of one and the same point, can only be conceived by one of them being presented in absolute space, but, instead of the other, a motion of an equal velocity in the contrary direction of the relative space [being presented] as identical with it.

Demonstration.

First Case.—Two motions *in the same line and direction* arrive at the same time in one and the same point.



Let two velocities, AB and ab, be presented as contained in one velocity of the motion. Let these velocities be assumed, for the time, as equal, $AB = ab$; in this case I assert they cannot be presented at once in the same point, in one and the same space (whether absolute or relative). For, because the lines AB and ab, denoting the velocities, are properly spaces, passed over in equal times, the composition of these spaces AB and $ab = BC$, and, therefore, the line AC, as the sum of the spaces, cannot but express the sum of both velocities. But the parts AB and BC do not, individually, present the velocity $= ab$; for they are not passed over in the same time as ab. Thus, the double line AC, which is traversed in the same time as the line ab, does not represent the double velocity of the latter, as was required. Hence the composition of two velocities in one direction *in the same space* does not admit of being sensuously presented.

On the contrary, if the body A be presented as moved in absolute space with the velocity AB, and I give to the relative space, a velocity $ab = AB$ in addition, in the contrary direction $ba = CB$; this is the same as though I distributed the latter velocity to the body in the direction AB (axiom 1). But the body moves itself, in this case, in the same time through the sum of the lines AB and $BC = 2\ ab$, in which it would have traversed the line $ab = AB$ only, and yet its velocity is conceived as the sum of the two equal velocities AB and ab, which is what was required.

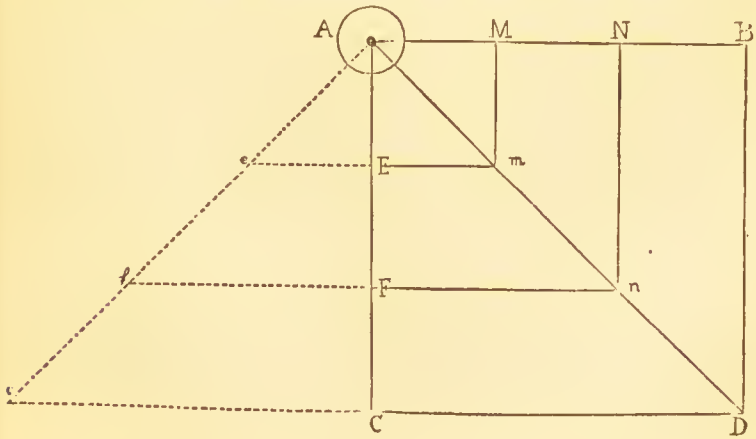
Second Case.—Two motions in *exactly contrary directions* are united in one and the same point.

Let AB be one of these motions, and AC the other in the opposite direction, the velocity of which we assume here to be equal to that of the first; in this case the very idea of representing two such motions, at the same time, in one and the same space, and in one and the same point, in short, the case of such a composition of motions would itself be impossible, which is contrary to the assumption.

On the other hand, let the motion AB be conceived as in absolute space, and instead of the motion AC in the same absolute space, let the contrary motion CA of the relative space [be conceived] with the same velocity, which (according to axiom 1) is equal to the motion AC, and may thus be entirely substituted for it; in this case two exactly opposite and equal motions of the same point, at the same time, may be very well presented. Now, as the relative space is moved with the same velocity $CA = AB$ in the same direction with the point A, this point, or the body, present therein, does not change its place in respect of the relative space; i.e., a body moved in two exactly contrary directions with equal velocity, rests, or generally expressed, its motion is equal to the difference of the velocities in the direction of the greater (which admits of being easily deduced from what has already been demonstrated).

Third Case.—Two motions of the same point are presented as combined *according to directions that enclose an angle.*

The two given motions are AB and AC, whose velocity and directions are expressed by these lines, but the



angle, enclosed by the latter, by *BAC* (it matters not whether it be a right angle, as in this case, or any other angle). If these two motions are to occur, at the same time, in the directions *AB* and *AC*, and indeed in the same space, they would not be able to occur, at the same time, in both these lines *AB* and *AC*, but only in lines running parallel to these. It would have, therefore, to be assumed, that one of these motions effected a change in the other (namely, the deviation from the given course), although the directions remained the same on either side. But this is contrary to the assumption of the proposition, which indicates by the word composition, that both the given motions are *contained* in a third, and must therefore be one with this, and not that, by one *changing* the other, a third is produced.

On the other hand, let the motion *AC* be taken as proceeding in absolute space, but instead of the motion *AB*, the motion of the relative space in the opposite direction. Let the line *AC* be divided into three equal parts, *AE*, *EF*, *FG*. Now, while the body *A* in absolute space passes over the line *AE*, the relative space, and therewith the point *E*, passes over the space *Ee* = *MA*; while the body passes over the two parts together = *AF*, the relative space and therewith the point *F*, describes the line *Ff* = *NA*; while, finally, the body passes over the whole line *AC*, the relative space, and therewith the point *C* describes the line *Cc* = *BA*. All this is the same as though the body *A* had passed over in these three divisions of time, the lines *Em*, *Fn* and *CD* = *AM*, *AN*, *AB*, and in the whole time in which it passes over *AC*, had passed over the line *CD* = *AB*. It is therefore at the last moment in the point *D*, and in the whole time gradually in all points of the diagonal line *AD*, which expresses the direction as well as the velocity of the compound motion.

Observation 1.

Geometrical *construction* demands that one quantity should be *identical* with the other, or two quantities in composition, with a third, not that they should produce the third as causes, which would be mechanical con-

struction. Complete similarity and equality, in so far as they can only be cognised in intuition, is *congruity*. All geometrical construction of complete identity rests on congruity. This congruity of two motions combined with a third (in short, the *motu composito* itself) can never take place, when the two former are presented in one and the same space, i.e. relative [space]. Hence all attempts to demonstrate the above proposition in its three cases, have always been mechanical solutions only, inasmuch, namely, as though moving causes by which a given motion was combined with another, were made to produce a third, the proofs that the former were the same as the latter, and as such, admitted of being presented in pure intuition *à priori* [were not given].

Observation 2.

When, for instance, a velocity AB is termed double, nothing else can be understood thereby, but that it consists of two simple and equal [velocities] AB and BC, (see Fig. 1). But if a double velocity be explained by saying that it is a motion by which a doubly great space is passed over in the same time, something is here assumed which is not necessarily implied, namely, that two equal velocities may be combined in the same way as two equal spaces, for it is not in itself obvious that a given velocity consists of smaller [velocities]; and in the same way that a rapidity consists of slownesses as a space does of smaller [spaces]. For the parts of the velocity are not outside one another, as the parts of the space; and if the former are to be considered as quantity, the conception of their quantity, as it is *intensive*, must be constructed in a different manner to that of the *extensive* quantity of space. But this construction is possible in no other way than by the *mediate* composition of two equal motions, one of which is that of the body, the other that of the relative space in the contrary direction, but which, for this reason, is completely identical with an equal motion of the body in the previous direction. For in *the same direction* two equal velocities would not admit of being compounded in one body, except through external moving causes; for

instance, a ship carrying the body with one of these velocities, while another movable force, immovably bound up with the ship, impresses upon the body the second velocity, which is equal to the previous one. In this it must always be presupposed that the body maintains itself in *free* motion with the first velocity when the second enters; but this is a natural law of moving forces, which cannot come into consideration when the question is simply how the conception of velocity is *constructed* as a quantity; so much as to the addition of velocities to one another. But when the question is of the subtraction of one from the other, this latter is easily *conceivable*, if the possibility of a velocity, as quantity by addition, has once been admitted; yet this conception cannot be so easily *constructed*, for to this end two contrary motions must be combined in one body; and how is this to happen? Immediately, namely, in respect of the same resting space, it is impossible to conceive of two equal motions in contrary directions in the same body; but the idea of the impossibility of these two motions in one body is not the conception of its *rest*, but of the *impossibility of the construction* of this composition of contrary motions, which is nevertheless assumed in the proposition as possible. Now this construction is not otherwise possible, than by the combination of the motion of the body with the *motion of the space* as has been demonstrated. Finally, as concerns the composition of two motions, whose direction encloses an angle, they do not admit of being conceived in a body, in reference to one and the same space, if one of them be not affected by an *external* continuous inflowing force (for instance, a vessel bearing the body onward), while the other maintains itself unaltered, or generally [expressed]: one must have as a basis, moving forces, and the production of a third movement from two combined *forces*, but this, although the *mechanical* carrying out of that which contains a conception, is not its *mathematical construction*, which has only to render intuitable what the object is (as quantum), not, how it may be transformed by nature or art, by means of sundry implements and forces. The composition of motions, in order to determine their relation to others as quantity, must take place

according to the rules of congruity, which is only possible, in all three cases, by means of the motion of the space that is congruous with one of the two given motions, whereby both are congruous with the compound [motion].

Observation 3.

Thus Phoronomy, not as pure doctrine of motion, but as pure doctrine of the quantity of motion, in which matter is conceived by no other quality but that of mere movability, contains nothing but this single proposition, carried out in the three cases adduced, of the composition of motion, and indeed of the possibility of *rectilinear motion* alone, not of curvilinear; for, because in the latter the motion is continuously changed in direction, a cause of this motion, which cannot be merely space, must be brought to bear. That only the single case in which the directions of the same enclose an angle, is usually understood by the designation *compound motion*, does some detriment to the principle of the division of a pure philosophical science generally, although not to physics: for, as concerns the latter, all the three cases treated in the above proposition admit of being adequately presented in the *third alone*. For when the angle enclosing the two given motions is conceived as infinitely small, it contains the first [case]; but if it be conceived as only divided in an infinitely small degree from a single straight line, it contains the second case; so that, in the proposition already stated respecting composite motion, all three cases mentioned by us, are capable of being given as in a universal formula. But in this way one could not learn to comprehend the qualitative doctrine of motion in its parts *à priori*, which in many respects is also useful.

If any one cares to connect the three parts in question of the universal Phoronomic proposition with the scheme of the subdivision of all pure conceptions of the understanding, here, especially with that of the conception of *quantity*, he will observe: that, as the conception of a quantity always contains that of the composition of the homogeneous, the doctrine of the composition of motions

is at the same time the pure doctrine of quantity therein; and indeed that in all three momenta furnished by space, the *unity* of line and direction, the *plurality* of directions in one and the same line, and finally the *totality* of directions as well as of lines, according to which the motion can take place, it contains the determination of all possible motion as quantum, although its quantity (in a movable point) consists merely in velocity. This observation only has its uses in transcendental philosophy.

SECOND DIVISION.

METAPHYSICAL FOUNDATIONS OF DYNAMICS.

Explanation I.

Matter is the *movable*, in so far as it fills a space. To *fill* a space means to resist everything movable, which endeavours by its motion to press into a certain space. A space that is not filled is an *empty space.*

Observation.

This is the dynamical explanation of the conception of matter. It presupposes the Phoronomic, but adds thereto a property that is related as cause to an effect, namely, the capacity of resisting a motion within a certain space. This could not come into consideration in the foregoing science, even when we had to do with the motions of one and the same point in opposite directions. This filling of space keeps a certain space free from the intrusion of any other movable when the motion of the latter is directed to any place within this space. On what the resistance of matter on all sides rests, and what it is, now remains to be investigated. But it may be already seen from the above explanation, that matter is not here considered as resisting *when it is driven from its place*, and thus as itself moved (this case will hereafter come into consideration as mechanical resistance), but only when the mere *space* of its own extension is to be diminished. The expression is used *to occupy space*, namely, to be immediately present in all its points, in order to indicate thereby the *extension* of a thing in space. But inasmuch as it is not defined in this conception, what effect, or whether any effect at all, arises from this presence, whether in resisting others that are attempting to press into it, or whether it signifies

merely a space without matter, in so far as it is a sum-total of several spaces, just as one may say of every geometrical figure, "it occupies a space" (it is extended); or even whether there be something in space necessitating another movable to penetrate deeper into the same (attracting others); because, I say, by the conception of the occupying of a space, all this is undetermined; so, *to fill a space* is a closer definition of the conception *to occupy* a space.

Proposition 1.

Matter fills a space, not by its mere *existence*, but by a *special moving force.*

Demonstration.

The penetration into a space (in the moment of commencement this is called the endeavour to penetrate) is a motion. The resistance to motion is the cause of its diminution, and also its change into rest. Now nothing can be connected with any motion, as lessening or destroying it but another motion of the same movable in the opposite direction (phoronomic proposition). Thus the resistance offered by a matter in the space which it fills, to all impression of another [matter], is a cause of the motion of the latter in the opposite direction; but the cause of a motion is called moving force. Thus matter fills its space by moving force and not by its mere existence.

Observation.

Lambert and others called the property of matter, by which it fills a space, *solidity* (a rather ambiguous expression), and maintained that we must assume it in everything *which exists* (substance), at least in the outer world of sense. According to their notions, the presence of something *real* in space, must carry with it this resistance by its very conception, in other words according to the principle of contradiction; and must exclude the co-existence of anything else, in the space of its presence. But the principle of contradiction does not preclude any matter from advancing, in order to penetrate into a space

in which another [matter] exists. Only when I attribute to that which occupies a space, a power of repelling everything externally movable which approaches it, do I understand how it involves a contradiction, that in the space which a thing occupies, another [thing] of the same kind should penetrate. Here the mathematician has assumed something as a first datum of the construction of the conception of a matter, which itself does not admit of being further constructed. Now he can begin his construction of a conception from any datum he pleases, without committing himself again to the further explanation of this datum; but he is nevertheless not thereby permitted to explain the former as something wholly incapable of any mathematical construction, in order by this means to prevent a return to the first principles of natural science.

Explanation II.

Attractive force is that moving force whereby a matter may be the cause of the approach of others to itself (or, which is the same thing, whereby it opposes the retreat of others from itself).

Repulsive force is that whereby a matter can be the cause of repelling others from itself (or, which is the same thing, whereby it resists the approach of others to itself). The latter we shall also sometimes term *driving*, and the former, *drawing* force.

Note.

These are the only two moving forces of matter admiting of being conceived. For all motion which one matter can impress upon another, as in this respect each of them is only considered as a point, must always be regarded as distributed in the straight line between two points. But in this straight line only two kinds of motion are possible, one, by which the above points *recede* from one another, and a second by which they *approach* one another. But the force which is the cause of the first motion is called *repulsive force*, and that of the second *attractive force*. Thus,

only these two kinds of forces, as such, to which all the forces of motion in material nature must be reduced, are capable of being conceived.

Proposition 2.

Matter fills its spaces by the repulsive forces of all its parts, i.e., by its own force of extension, which has a definite degree, beyond which smaller or larger [degrees] can be conceived to infinity.

Demonstration.

Matter fills a space only by moving force (proposition 1), this being such as to resist the impression, that is, the approach of others. Now this is a repulsive force (explanation II.). Thus matter fills its space, and indeed all the parts thereof, by repulsive forces only, because otherwise a part of its space would not be filled (against the assumption), but would only be enclosed. *But the force of an extended by virtue of the repulsion of all its parts* is a *force of extension* (expansive). Thus matter fills its space by its own force of extension; *which was the first point.* Beyond every given force a greater must be conceived, for that beyond which there is no greater possible would be one, whereby, in a finite time, an infinite space would be passed over (which is impossible). Further, beyond every *given* moving force a smaller must be able to be conceived (for the smallest would be that, by the infinite addition of which to itself, throughout any given time, no finite velocity could be generated, but this signifies the lack of all moving force). Thus below every given degree of a moving force, a smaller must always be able to be given; *which is the second* [*point*]. The force of extension, therefore, whereby all matter fills its space, has its degree, which is never the greatest or smallest; but beyond which, greater as well as smaller, may be found to infinity.

Note 1.

The expansive force of a matter is termed *elasticity.* Now as the former is the basis on which the filling of

space, as an essential property of all matter, rests, this elasticity must be termed *original;* seeing that it cannot be derived from any other property of matter. All matter is accordingly originally elastic.

Note 2.

Because beyond every extending force a greater moving force can be found, which might work against it, and would thus diminish the space it is seeking to extend; in which case the latter would be termed a *compressive* force; so for every matter a compressive force must be able to be found, capable of driving it from every space it fills into a narrower space.

Explanation III.

A matter *penetrates* another in its motion when it completely abolishes the space of its extension by compression.

Observation.

When, in the sucker of an air-pump that is filled with air, the piston is driven nearer the bottom, the air-matter is compressed. Now if this compression could be carried so far that the piston completely touched the bottom (without the least amount of air escaping), the air-matter would be penetrated; for the matters, between which it is, leaving no superfluous room for it, it would exist between the bottom and the piston, without occupying a space. This penetrability of matter by external compressive forces, if one were willing to assume, or even conceive, such, would be termed *mechanical.* I have reasons for distinguishing by such a limitation, this penetrability of matter from another [kind], the conception of which is perhaps just as impossible as that of the present, and of which I may hereafter have occasion to make some mention.

Proposition 3.

Matter *can be* compressed to infinity, but it can never be *penetrated*, by a matter, it does not signify how great its pressing force.

Demonstration.

An original force, by which a matter seeks to extend itself on all sides over a given space occupied by it, must, enclosed in a smaller space, be greater, and compressed into an infinitely small space, be infinite. Now, for any given extensive force of matter, a greater compressive force may be found that compels it into a smaller space, and so on to infinity; which was the first [point]. But for the penetration of a matter, a compression into an infinitely small space, and therefore an infinitely compressive force, is required, which is impossible. Hence, a matter cannot be penetrated by the compression of any other [matter]; which is the second [point].

Observation.

I have, at the commencement of this demonstration, assumed that an extending force, the more it is narrowed, must operate so much the more strongly in the opposite [direction]. Now this would not apply to all kinds of elastic forces, [including those] that are merely derivative; but with matter possessing essential elasticity, in so far as it is matter in general, filling a space, it may be postulated. For expansive force exercised from all points towards all sides, constitutes its very conception. But the same quantum of expanding forces, brought into a narrower space, must, in every point of the latter, repel so much the more strongly, in inverse proportion to the smallness of the space in which a given quantum of force diffuses its activity.

Explanation IV.

The *impenetrability* of matter, resting on resistance, which increases proportionately to the degree of the compression, I term *relative;* but that which rests on

the *assumption* that matter, as such, is capable of no compression at all, is termed *absolute* impenetrability. The *filling of space* with absolute impenetrability may be termed *mathematical;* that with merely relative [impenetrability] *dynamical* filling of space.

Observation 1.

According to the mere mathematical conception of impenetrability (which assumes no moving force as originally inherent in the matter), no matter is capable of compression, except in so far as it contains within itself empty spaces. Matter, therefore, as matter, resists all impression unconditionally and by absolute necessity. But according to our explanation of this property, impenetrability rests on a physical basis; for the extensive force renders it primarily possible, as an extended that fills its space. But as this force has a degree that overpowers, and hence diminishes the space of extension, that is, can be impressed upon the same up to a certain degree, by a given compressive force, but only in suchwise that the entire penetration, inasmuch as it would require an endless compressive force, is impossible; [therefore] *the filling of space must be regarded only as relative impenetrability.*

Observation 2.

Absolute impenetrability is, indeed, neither more nor less than a *qualitas occulta.* For we ask the cause, why matters in their motion cannot penetrate one another; and receive the answer: because they are impenetrable. The appeal to repulsive force is free from this objection. For although this likewise cannot be explained further, according to its possibility, and hence must be admitted as a fundamental force, it nevertheless gives a conception of an active cause and its laws, in accordance with which the effect, namely, the resistance in the filled space, may be estimated according to its degrees.

Explanation V.

Material substance is that in space, which for itself, namely, separated from all else existing outside it in space, is movable. The motion of a part of matter whereby it ceases to be a part, is separation. The *separation* of the parts of a matter is *physical division.*

Observation.

The conception of a substance signifies the ultimate subject of existence, namely, that which does not itself belong, as mere predicate to the existence of another. Now matter is the subject of all that, in space, which can be counted [as belonging] to the existence of things; for outside it, no subject would be able to be conceived, but space itself; and this is not a conception containing anything existent, but merely the necessary conditions of the external relation of possible objects to our sense. Matter then, as the movable in space, is substance therein. But just in the same way are all its parts substances, in so far as one can say of them that they are subjects, and not merely predicates of other matters; and hence must again themselves be termed matter. But they are themselves subjects, if they are something movable existing in space, and hence not in combination with other adjacent parts. The independent motion of matter, then, or any of its parts, is a demonstration at once, that this movable, and every movable part of it, is substance.

Proposition 4.

Matter is *divisable to infinity* into parts, of which each is again matter.

Demonstration.

Matter is impenetrable by its own original force of extension (proposition 3); but this is only the result of the repulsive forces of each point in a space filled with matter. Now the space that is filled by matter is mathe-

matically divisible to infinity; that is, its parts can be distinguished to infinity, although they cannot be moved, and consequently cannot be separated (according to demonstrations of geometry). But in a space filled with matter, every part contains the same repulsive force, to counteract all other forces, on all sides; in other words, to drive them back, and in the same way to be driven back by them, that is, to be moved to a distance from them. Hence, every part of a space filled with matter is, movable in itself, and consequently separable from those remaining, as material substance, by physical division. So far, then, as the mathematical divisibility of space filled by a matter reaches, thus far does the possibility of the physical division of the substance that fills it, reach. But the mathematical division extends to infinity, and consequently also the physical; that is, all matter, is divisible to infinity, and indeed to parts, of which each is itself again material substance.

Observation 1.

By the demonstration of the infinite divisibility of space, that of matter has not, by a long way, been proved, if it has not previously been established, that in every part of space material substance exists, that is, that parts in themselves movable are to be met with. For if a *monadologist* wished to assume that matter consisted of physical points, each of which (for this reason) had no movable parts, but nevertheless, filled a space by mere repulsive force, he would still be able to admit that this space, although not the substance acting in it (in other words, the sphere of the latter's activity, though not the acting movable subject itself), could be divided by the division of its spaces. He would thus compound matter of physical by indivisible parts, and yet allow it to occupy space in a *dynamical manner*.

But by the above demonstration, the monadologist is entirely deprived of this resort. For, thereby it is clear, that in a filled space there can be no point that does not itself resist repulsion on all sides in the same way as it is repelled; in other words, as a reacting subject, in itself movable, existing outside every other repulsive point; and hence that the hypothesis of a point filling a

space by its mere driving force, and not by means of other equal repulsive forces, is impossible. In order to make this, and thereby also the demonstration of the previous proposition apparent, one must assume that A is the place

of a monad in space, that ab is the diameter of the sphere of its repulsive force, and therefore that aA is its semi-diameter; so between a, where the impression of an external monad in space, occupying the sphere in question, is understood, and the central point of the latter [viz., the sphere], A, a point c is possible to be indicated (in accordance with the infinite divisibility of space). Now, if A resist that which seeks to impress itself on a, c must resist both the points A and a. For if this were not so, they would approach one another with impunity; consequently A and a would meet in the point c, i.e. the space would be penetrated. Something must thus exist in c that resists the impression of A and a, and thus repels the monad A as much as it is repelled by it. As now, *repulsion* is a movement, c is something movable in space; in other words, matter, and the space between A and a, could not be filled by the sphere of the activity of a single monad, neither could the space between c and A, and so on to infinity.

When mathematicians conceive the repulsive forces of the parts of elastic matters in their greater or lesser compression, as increasing or diminishing in a certain proportion to their distances from one another (for instance, that the smallest parts of the air repel each other in inverse proportion to their distances from one another, because their elasticity stands in inverse proportion to the spaces in which they are compressed), one would wholly mistake their meaning and misapply their language were one to attribute to the conception in the object itself, what [nevertheless] necessarily belongs to the process of the construction of a conception. For, according to the above, all contact can be conceived as an infinitely small

cases where a larger or smaller space is to be conceived as entirely filled by the same quantity of matter, that is, by an identical quantum of repulsive forces. By an infinitely divisible [thing], therefore, no real distance of parts, which, with all extension of the space of the whole, always constitute a continuum, may be assumed, although the possibility of this extension can only be made comprehensible under the idea of an infinitely small distance.

Observation 2.

Mathematics can indeed, in its internal employment, be quite indifferent to the chicane of a mistaken metaphysics, and rest in the certain possession of its evident assertions of the *infinite divisibility of space*, no matter what objections a sophistry, clinging to mere conceptions, may throw in its way; but in the application of its propositions, which apply to space, to substance, which fills it, it must rely on a test according to mere conceptions; in other words, on metaphysics. The above proposition is itself a proof of this. For it does not follow necessarily that matter is physically divisible to infinity, although it is so in a mathematical connection, every part of space being again a space, and hence always including *within itself* parts external to one another; but this cannot prove that in every possible part of this *filled* space, there is *substance*, which, consequently, separated from all the rest, exists as in itself, movable; something has been wanting then hitherto, to the mathematical demonstration, without which it can have no certain application to Natural Science, and this defect has been obviated in the proposition above given. But as concerns the remaining attacks of metal physics on the *at present physical proposition*, of the infinite divisibility of matter, the mathematician must entirely resign himself to the philosopher, who, apart from this, through these objections, betakes himself into a labyrinth, out of which it is difficult for him to find his way, even in questions immediately concerning him, and hence has enough to do on his own account, without the mathematician mixing himself up in the business. If, namely, matter be infinitely divisible, then (concludes the dogmatic

metaphysician), *it consists of an infinite number of parts;* for a whole must originally contain within itself all the parts into which it can be divided, in their entirety. But the latter proposition is also indubitably certain of every whole as a *thing in itself*, and, therefore, although one cannot admit matter, or even space, *to consist of infinitely many parts* (inasmuch as it is a contradiction to think of an infinite number, the conception of which itself implies that it can never be conceived as fully ended), one must resolve either to defy the geometrician by saying *space is not infinitely divisible*, or to irritate the metaphysician [by saying], *space is no property of a thing in itself*, and hence, matter is no thing in itself, but the mere phenomenon of our external sense generally, just as space is its essential form.

The philosopher now finds himself in a strait between the horns of a dangerous dilemma. To deny the first proposition, that space is divisible to infinity, is a vain undertaking, for mathematics does not admit of being reasoned away; but yet to regard matter as a thing in itself, in other words, space as property of the thing in itself, and to deny the above proposition, is one and the same thing. He sees himself thus necessitated to depart from this assertion, however common and suited to the common understanding it may be; but of course only under the condition, that in the event of his reducing matter and space to the phenomenon (hence the latter [viz. space] to the form of our external sensuous intuition, and so [constituting] both, not things in themselves, but only subjective modes of the presentation to us, of objects in themselves unknown), he should be helped out of the difficulty as to the *infinite divisibility* of matter, while it yet does *not* consist of *infinitely many parts*. This latter easily admits of being conceived by the Reason, although impossible to construct and render intuitable. For of that which is only real by its being given in presentation, there is not *more* given than is met with in the presentation, that is, so far as the progressus of presentations reaches. Thus we can only say of phenomena, the division of which goes on to infinity, that there exist so many of the parts of the phenomenon, as we give of them, that is, as far as we can ever subdivide. For the parts,

as belonging to the existence of a phenomenon exist only in thought, namely, in their division itself. Now though the division proceeds to infinity, it is never given as infinite, and hence it does not follow that the divisible contains an infinite number of parts *in itself* and outside our presentation merely because its division is infinite. For it is not the thing, but only its presentation, whose division could be continued to infinity, and in the object that is unknown in itself, which has also a cause, and yet can be never completed and consequently fully given, it proves no real infinite number, for this would be an express contradiction. A great man who has perhaps contributed more than any one else to maintain the reputation of mathematics in Germany, has more than once turned aside metaphysical claims to upset the propositions of geometry relative to the infinite divisibility of space with the well-grounded observation, *that space only belongs to the phenomenon of external things;* but he has not been understood. The proposition was taken as though he meant: space appears to us, otherwise it is a thing or relation of things in themselves, but the mathematician considers it only as it appears. Instead of this he ought to have been understood [as meaning] that space is no quality appertaining to anything outside our senses, but only to the subjective form of our sensibility, under which objects of our external sense, unknown to us as to their construction in themselves, appear to us, this appearance being termed matter. By the foregoing misunderstanding, space was always conceived as a quality [existing] independently, outside our faculty of presentation, but which the mathematician only thought of according to common conceptions, that is, confusedly (for so appearance [phenomenon] is commonly explained); it ascribed the mathematical proposition of the infinite divisibility of matter, a proposition presupposing the highest clearness in the conception of space, to a confused presentation of space, which the geometrician laid at his foundation. In this way, it remained open to the metaphysician to compound space of points, and matter of simple parts, and thus in his opinion to bring clearness into the conception. The ground of the confusion lies in a mis-

understood *monadology*, which does not belong to the explanation of natural phenomena, but is a platonic conception of the world, carried out by Leibnitz. This is correct in itself, in so far as it [the world] is regarded, not as object of sense, but as thing in itself; but is nevertheless a mere object of the understanding, though it lies at the foundation of the phenomena of sense. *The composite of things in themselves* must consist in the simple; for the parts must here be given before all composition. But the *composite in the phenomenon* consists not of the simple, because in the phenomenon, which can never be given otherwise than as composite (extended), the parts can only be given through division, and thus not before the composite, but in it. Hence Leibnitz's opinion, so far as I understand, [did not consist] in explaining space by the arrangement of simple entities side by side, but rather in [regarding it] as corresponding to a merely intelligible, for us unknown, world by its side, and maintained nothing more than what has elsewhere been shown, namely, that space, together with matter of which it is the form, comprises, not the world of things in themselves, but only the phenomenon of this [world], and is itself only the form of our sensuous intuition.

Proposition 5.

The possibility of matter requires *a force of attraction*, as its second essential fundamental force.

Demonstration.

Impenetrability, as the fundamental quality of matter, whereby it first reveals itself as something real in the space of our external senses, is nothing but the capacity of extension in matter (proposition). Now an essentially moving force, by which parts of matter recede from one another, cannot, *firstly*, be limited by itself, because matter is rather impelled thereby to extend the space it fills continuously; *secondly*, it cannot be fixed by space alone, at a certain boundary of extension—for though space may contain the ground of [the fact] that with the increase of the volume of a matter extending itself, the extending

distance, which, moreover, must necessarily happen in force will become weaker in inverse proportion—yet, inasmuch as smaller degrees of every moving force are possible to infinity, it cannot contain the ground for their ever ceasing. Matter then, by its repulsive force alone (which contains the ground of its impenetrability), and if no other opposing force contradicted this, would be held within no boundaries of extension, that is, would dissipate itself to infinity, and no assignable quantity of matter would be met with in any assignable space. With merely repulsive forces of matter, all spaces would consequently be empty, in other words no matter would properly speaking exist at all. To the existence of all matters, forces opposed to the extending [forces], in other words, compressive forces, are requisite. But these again cannot be sought for originally, in the opposition of another matter, for it requires, in order that it may be matter, itself a compressive force. An original force of matter, working in an opposite direction to the repulsive, in other words [a force] of approach, that is, an attractive force must be assumed. Now as this attractive force belongs to the possibility of a matter, as matter generally, consequently precedes all distinctions of the same, it must not be ascribed merely to a special species [of matter], but to every matter generally and originally. An original attraction then belongs to all matter as a fundamental force pertaining to its essence.

Observation.

With this transition from one property of matter to another specifically different from it, which yet equally belongs to the conception of matter, *although it is not contained therein*, the attitude of our understanding must be more closely considered. If attractive force be itself originally requisite to the possibility of matter, why do we not equally make use of it with impenetrability as the primary sign of a matter? why is the last immediately given with the conception of a matter, while the first is not thought in the conception, but only attributed to it, by inference? That our senses do not allow us to perceive attraction so immediately as repulsion and the resistance

of impenetrability, does not sufficiently solve the difficulty. For if we had such a faculty, it is easy to comprehend that our understanding would none the less choose the filling of space, in order to indicate thereby the substance in space, namely, matter, just as in this *filling*, or, as it is otherwise called, solidity, the characteristic of matter as a thing distinct from space, is posited. Attraction, it matters not how well we might feel it, could never reveal to us a matter of definite *volume* and *figure*, nor anything beyond the endeavour of our organ to approach a point outside us (the central point of the attracting body). For the attractive force of all parts of the earth can affect us, neither more nor otherwise, than if it were wholly concentrated in its central point, and it were this alone that influenced our sense; similarly with the attraction of a mountain, and of every stone, &c. We should acquire thereby no definite conception of any object in space, as neither figure nor size, nor even the place where it exists, could fall within our senses. The mere direction of the attraction would be able to be perceived as in weight; the attracting point would be unknown, and I do not see how it could be arrived at, through conclusions, without the perception of matter, in so far as it fills space. It is hence clear, that the first application of our conceptions of *quantity* to matter, by which it is primarily possible for us to transform our external perceptions into the experiential conceptiou of a matter as object generally, is only founded on its property of filliug space, which by means of the sense of feeling, procures for us the size and figure of an extended, and therewith a conception of a definite object in space which must be laid at the foundation of all else that one can predicate of any [particular] thing. This is undoubtedly the reason why, with what are the clearest proofs otherwise, that attraction must belong to the fundamental forces of matter, equally as much as repulsion, one is so unwilling to admit it, or to concede any other moving forces but those of impact and pressure (both by means of impenetrability). For that whereby space is filled is substance, it is said, and this is correct enough. But as substance only reveals its existence to us by sense, whereby we perceive its impenetrability,

namely by feeling—and therefore only in reference to contact, whose beginning (in the approach of one matter to another) is termed impact, but its continuation pressure —it seems as though the immediate effect of one matter on another could never be anything else but pressure or impact, the only two influences we can immediately feel; while on the other hand attraction, which can give us either no feeling at all, or at least no definite object of it, becomes difficult for us to conceive as fundamental force.

PROPOSITION 6.

By mere attraction, without repulsion, no matter is possible.

Demonstration.

Attractive force is the moving force of matter, whereby it compels another [matter] to approach it; consequently, when it is met with, between all parts of matter, the matter seeks by means of it to diminish the distance of its parts from one another, and therefore the space that they together occupy. Now nothing can hinder the effect of a moving force, except another moving force opposed thereto, but this [force] that is opposed to it is repulsive force. Thus, without repulsive forces, and by mere approach, all parts of matter would approach one another without hindrance and diminish the space that they occupy. As now, in the case assumed, there is no distance of parts, in which a greater approach through attraction is rendered impossible by a repulsive force, they would move towards one another until no distance existed between them; that is, they would coalesce in a mathematical point, and the space would be empty; in other words, without any matter. Matter is accordingly impossible by mere attractive forces, without repulsive.

Note.

That property, on which the inner possibility of a thing rests as its condition, is an essential element therein. Hence repulsive force belongs just as much to the essence of matter as attractive force; and the one cannot be separated from the other in the conception of matter.

Observation.

As no more than two moving forces in space, repulsion and attraction, can ever be conceived, it was previously necessary—to prove the union of both in the conception of a matter generally *à priori*—that each should be considered separately, in order to see what taken singly they could achieve in the presentation of a matter. It is evident now that as well when we lay neither of them at the basis, as when we assume merely one of them, space always remains empty, and no matter exists therein.

EXPLANATION 6.

Contact in the physical sense is the immediate action and reaction *of impenetrability*. The action of one matter upon another outside contact is *action at a distance* (*actio in distans*). This action at a distance, which is also possible without a medium between matters lying within oneanother, is called immediate action at a distance, or the action of matter on another [matter] *through empty space*.

Observation.

Contact, in a mathematical signification, is a common boundary of two spaces, and is hence neither within the one nor the other space. Straight lines therefore cannot touch one another, but when they have a point in common, it belongs as much within the one as the other of these lines, when they are produced, that is, cut one another. But circle and straight line, circle and circle, touch each other in a point, surfaces in a line, and bodies in surfaces. Mathematical contact therefore is laid at the basis of the physical, but does not alone constitute it; in order that the latter may arise, a dynamical relation must be superadded in thought, and that, not of the attractive, but of the repulsive forces, namely, those of impenetrability. Hence physical contact is the reciprocal action of repulsive forces in the common boundary of two matters.

PROPOSITION 7.

The attraction essential to all matter is an immediate effect of it on other matter, through empty space.

Demonstration.

The original attractive force itself contains the ground of the possibility of matter as that thing which fills a space in a definite degree, in other words of the very possibility of a physical contact. Hence, it must precede this, and its effect must consequently be independent of the condition of the contact. Now, the effect of a moving force is independent of all contact—independent even of the filling of space between the moving and the moved, that is, it must take place without the space between them being filled up, and, therefore, as an effect through empty space. The original and essential attraction of all matter is then an immediate effect of the same upon another [matter] through empty space.

Observation 1.

That the possibility of fundamental forces should be made conceivable is a quite impossible demand: for they are called fundamental forces, precisely because they cannot be deduced from any other, that is, cannot be conceived. But the original attractive force is not one whit *more inconceivable* than the original repulsion. It does not so immediately obtrude itself on the senses as impenetrability, in affording us conceptions of definite objects in space. Hence, while it is not felt, but only to be inferred, it has the appearance of a deduced force, just as though it were only a hidden play of moving forces [produced by] repulsion. More closely considered, [however,] we see that it cannot be further deduced from any source, least of all from the moving force of matters, through their impenetrability, as its effect is precisely the opposite of the latter. The commonest objection to immediate effect at a distance is,

that a matter cannot directly operate *where it is not.* If the earth directly influences the moon to approach it, the earth acts upon a thing many thousand miles removed from it, and nevertheless [acts] immediately, even though the space between it and the moon were regarded as entirely empty. For, although matter may exist between two bodies, this does not affect the attraction. It acts, therefore, directly, in a place where it is not; something, to all appearance, contradictory. But it is so far from being contradictory, that one might rather say: everything in space acts on another [thing] in a place where the acting [thing] is not. For if it acted in the place where it was itself, the thing on which it acted would not be *outside* it; for *outside* signifies presence in a place, where the other is not. If earth and moon touched one another, the point of contact would be a place where neither earth nor moon existed, for they would be removed from one another by the sum of their diameters. In the point of contact, moreover, no portion, either of the earth or of the moon would exist, for this point lies at the boundary of either filled space, which constitutes no portion either of the one or of the other. Thus, that matters cannot act upon each other at a distance is as much as to say they cannot act immediately upon one another, without the intervention of the forces of impenetrability. Now this would be as much as though I were to assert, that the repulsive forces were the only ones by means of which matters could be operative, or they were at least the necessary conditions under which alone matters could act upon one another, which would declare the force of attraction either wholly impossible or always dependent on the action of repulsive forces; but both are assertions without any foundation. The confusion of the mathematical contact of spaces and physical [contact] through repulsive forces constitutes the ground of this misunderstanding. To attract immediately outside contact, means to approach one another according to a constant law, without the force of repulsion containing the condition thereto, which must admit of being conceived just as well as directly to repel one another, that is to fly from one another according to a constant law, without the attractive force having any share therein. For the two moving

forces are wholly different in kind, and there is not the least reason for making one dependent on the other, or denying its possibility without the intervention of the other.

Observation 2.

Except from attraction, no motion can arise on contact, for contact is the reciprocal action of impenetrability, which restrains all motion. Some immediate attraction must thus be found apart from contact, in other words, at a distance; for otherwise, even the pressing and impulsive forces, which produce the effort to approach, as they act in an opposite manner to the repulsive force of matter, could have no cause at least originally inherent in the nature of matter. That attraction which takes place without the intervention of repulsive forces may be termed the *true* attraction, that which proceeds in the other manner the *apparent.* For properly, the body which another is striving to approach, exercises no attractive force whatever on the latter, because this has been driven towards it from elsewhere by impact. But even these apparent attractions must, at last, have a true one at their basis, because matter made up only of pressure or impact, instead of attraction would not even be matter without attractive forces (proposition 5), and consequently the mode of explaining all phenomena of approach by *merely apparent* attraction moves in a circle. It is commonly held that Newton did not find it necessary to his system to assume an immediate attraction of matters, but with the strictest abstinence of pure mathematics, left the physicists perfect freedom, in this particular, to explain its possibility as they might find good, without mixing up his propositions with their play of hypotheses. But how could he base the proposition that the universal attraction of bodies, exercised by them equidistantly on every side is proportioned to the quantity of their matter, if he did not assume that all matter exercised this force of motion simply as matter, and by its essential property? For although, indeed, between two bodies, whether homogeneous or not, as to matter, if one draws the other, the mutual approach (according to the law of the equality of reciprocal action) must always

occur in inverse proportion to the quantity of the matter, this law only constitutes a principle of mechanics, but not of dynamics, i.e., it is a law of *motions*, following from attractive forces, not the proportion of *attractive forces* themselves, and applying generally, to all moving forces. If, therefore, a magnet be attracted by another similar magnet, and again by the same magnet enclosed in a wooden box double its weight, in the latter case this will impart more relative motion to the first [magnet] than in the former, although the wood, which increases the quantity of its matter, adds nothing to its attractive power, and proves no magnetic attraction of the box. Newton says (*cor.* 2, *prop.* 6, *lib. III.*, *Princip. Phil. Nat.*): "If the æther or any other body existed without weight, it would, inasmuch as it differs from any other matter in nothing but in form, be capable of being transformed little by little through a gradual change of this form into a matter of the same kind as that which has the greatest weight; and conversely, this latter, by a gradual change of its form, might lose all its weight, which is contrary to experience," etc. Thus he did not even exclude the æther (much less other matters) from the law of attraction. What kind of matter, then, could remain for him, by the mere impact of which the approach of bodies to one another could be regarded as merely apparent attraction? One cannot, therefore, adduce the great founder of the theory of attraction as our precursor, if one takes the liberty of substituting for the true attraction which he maintained, a false one, and for assuming the *necessity* of an impulse through *impact*, in order to explain the phenomena of approach. He justly made abstraction of all hypotheses, in solving the problem, as to the cause of the universal attraction of matter; for this problem is physical or metaphysical, but not mathematical, and although in the preface to the second edition of his Optics, he says: *ne quis gravitatem inter essentiales corporum proprietates me habere existimet, quæstionem unam de ejus causa investiganda subjeci*, one can easily see that the dislike his contemporaries, and perhaps he himself, had to the conception of an original attraction, made him at issue with himself. For he could not say, unconditionally, that the attractive forces of two planets

—for instance, Jupiter and Saturn—which they show in the equal distances of their satellites (whose mass is unknown), is proportioned to the quantity of the matter of these heavenly bodies, if he did not assume that they attracted other matter merely as matter—in other words, according to a universal property of the same.

Explanation 7.

A moving force, by which matters can directly act upon one another only in the common surface of contact, I call a *superficial force;* but that whereby one matter can directly act on the parts of the other beyond the surface of contract, a *penetrative force.*

Note.

The repulsive force, by means of which matter fills a space, is a merely superficial force. For the parts touching each other mutually limit each other's sphere of action, and the repulsive force cannot move any more distant part, except by means of those lying between, and an immediate effect of a matter, passing straight through these, on another, by means of the forces of extension, is impossible. An attractive force, on the contrary, by means of which a matter occupies a space, *without filling it*, by which therefore it acts on other distant [matters] *through empty space*, and whose action thus posits no matter intervening [would have] no[1] limits. Now it is thus that the original attraction which makes matter itself possible, must be conceived, and which is hence a penetrative force, and for this reason alone always proportioned to the quantity of the matter.

Proposition 8.

The original attractive force, on which the possibility of matter itself as such rests, extends itself directly throughout the universe to infinity, from every part of the same to every other part.

[1] The verb is wanting to this sentence in the original.—[Tr.]

Demonstration.

Because the original attractive force pertains to the essence of matter, it belongs to every part of the same, to act directly at a distance. Now let it be granted, there is a distance beyond which it does not extend, *this limitation* of the sphere of its activity would rest either on the *matter* lying within this sphere, or merely on the size of the *space*, in which the influence was extended. The first does not take place; for this attraction is a penetrative force, and acts *directly* at a distance, in spite of all intervening matters, through each space as an empty space. The second, in the same way, does not take place. For inasmuch as every attraction is a moving force, having a cause, beyond which smaller can be conceived to infinity; so, in the greater distance, a cause would indeed lie, for diminishing the degree of attraction in inverse proportion, to the amount of the diffusion of the force but never for completely destroying it. As then there is nothing that anywhere limits the sphere of the activity of the original attraction of any part of matter, it extends itself beyond all assignable limits to every other matter, in other words, [extends itself] throughout the universe, to infinity.

Note 1.

From this original attractive force, as a penetrative [force] exercised by all matter upon all other matter—and therefore in proportion to the quantity of the same, extending to all possible regions of its activity—in combination with its opposite, namely, repulsive force, the limitation of the latter, in other words, the possibility of a space filled in a definite degree, can be deduced; and thus the dynamic conception of matter as the movable, filling its space can (in a definite degree) be constructed. But to this, one requires a law of relation, as well of the original attraction as of repulsion at different distances of matter, and of its parts from one another, which, as it rests simply on the difference of direction of these two forces (since a point is driven either to approach others or to recede from

them), and on the size of the space, in which these forces diffuse themselves at different distances, is a task belonging to pure mathematics, and with which metaphysics is no longer concerned, not even as regards the responsibility of constructing the conception of matter in this way, in the event of its non-success. For it is responsible only for the correctness of the elements of construction vouchsafed to our cognition of pure Reason, but for the inadequacy and the limits of our Reason, in its working out, it is not responsible.

Note 2.

As all given matter must fill its space with a definite degree of repulsive force, in order to constitute a definite material thing, only an original attraction in conflict with the original repulsion can make a definite degree of the filling of space, in other words, matter, possible. This is so, whether the former results from the proper attraction of the parts of the compressed matter amongst each other, or from their union with the attraction of all matter.

The original attraction is proportional to the quantity of the matter, and extends to infinity. Thus the filling of a space by matter, definite as to amount, can in the end only be effected by the infinitely extending attraction of the same, and every matter [must be] distributed according to the amount of its repulsive force.

The effect of the universal attraction, which all matter exercises directly upon all [matter] and at all distances, is termed *gravitation;* the endeavour to move itself in the direction of the greater gravitation is *weight.* The effect of the thorough going repulsive force of the parts of each given matter is termed its *original elasticity.* This and weight therefore, constitute the only discoverable *à priori* universal characteristics of matter, the former in internal, the latter in external relations; for on their mutual bases the possibility of matter itself, rests; *cohesion* (*zusammenhang*), when explained as the reciprocal attraction of matter, limited simply to the condition of contact, does not belong to the possibility of matter in general, and cannot therefore be cognised as bound up with it *à priori.* This characteristic would hence not be metaphysical but

physieal, and thus would not belong to the present subjeet of eonsideration.

Observation 1.

I eannot forbear adding a small preliminary observation, for the sake of any attempt that may perhaps be made toward such a possible eonstruetion.

1. It may be said of every force, immediately working at different distanees, and whieh is limited in respeet of the degree whereby it exereises moving foree, on every given point at a eertain distanee, only by the size of the space over whieh it has to diffuse itself in order to aet upon this point; that in all spaees over whieh it is diffused, however small or great they may be, it always constitutes an equal quantum; but that the degree of its effeet on the particular point in this space always stands in inverse proportion to the spaee in whieh it has had to diffuse itself, in order to aet upon it [viz. the point]. So, for instanee, light diffuses itself from a luminous point on all sides, in discs that inerease with the square of the distanee, and the quantum of the luminosity is in all these infinitely inereasing dises on the whole the same; whenee follows, that an equal part assumed in these dises, must be, in point of degree, so mueh the less luminous as the surfaee (diffusion of the same quantity of light is greater; and so with all other forees, aecording to the laws of which they must diffuse themselves either in superficial or corporeal spaee, in order to act aeeording to their nature on distant objeets. It is better to represent the diffusion of a moving foree from one point at all distanees in the ordinary way, [not?] for instanee [as?] in optics, by rays diverging in a cirele from a eentral point. For as lines drawn in this way ean never fill the spaee through whieh they pass, nor therefore the surface whieh they toueh, it matters not how many of them may be drawn or supposed—this being the inevitable eonsequenee of their divergenee—they give oeeasion to troublesome inferenees, and these to hypotheses, whieh ean easily be avoided if merely the size of the whole dise be taken into eonsideration, as *uniformly* illumined by the same quantity of light, and of course the degree of its luminosity, in

every place, as assuming an inverse proportion to the size of the whole; and similarly with every other diffusion of a force, through spaces of different sizes.

2. If the force be an immediate attraction at a distance, the direction of the attraction must still less be represented as rays going out from the attracting point, but rather as coalescing from all points of the surrounding disc (the diameter of which is the given distance) at the attracting point. For the line of direction of the movement to this point, which is its cause and goal, assigns the *terminus a quo*, whence the lines must begin, namely from all points of the surface, from which they take their direction to the attracting middle-point, and not conversely; for the size of the surface alone determines the number of lines; the middle point leaves them undetermined.[1]

3 If the force be an immediate repulsion, so that a point

[1] It is impossible to represent surfaces at given distances as wholly filled by the action of lines spreading out from a point in the form of rays, whether of luminosity or attraction. Thus, by such diverging rays of light, the inferior luminosity of a distant surface would merely rest on the fact that between the luminous there remain non-luminous places, and these so much the larger the farther the surfaces are removed. Euler's hypothesis avoids this inconvenience, but has certainly so much the greater difficulty in rendering the rectilinear motion of the light conceivable. But this difficulty arises from an easily avoidable mathematical conception of light-matter as a mass of globules, which according to their variously oblique arrangement, as regards the direction of the impact, would produce a lateral motion of light; whereas nothing prevents us from conceiving this matter as originally and in every sense fluid, instead of as divided into fixed globules. If the mathematician wishes to render intuitable the diminution of light by increasing distance, he makes use of rays spreading in a circle, in order to exhibit on the disc of its diffusion the size of the space, in which the same quantity of light is to be uniformly diffused between these circle-rays, in short, the diminution of the degree of luminosity; but he does not intend these rays to be regarded as the only [places of] luminosity, as though there were always places devoid of light, to be met with between them, these increasing with the distance. If one wishes to conceive each of these places as throughout luminous, the same quantity of luminosity which covers the smaller must be conceived as in equal proportion in the larger, and therefore, in order to indicate the rectilinear direction, they must be drawn from the surface and all its points to the luminous straight lines. The effect and its quantity must be previously fixed, and the cause indicated in accordance therewith. The same applies to rays of attraction, if one chooses to call them so, and indeed to all directions of forces, which are to fill a space, be it even a corporeal one, from a point.

(in merely mathematical presentation) fills a space *dynamically*, and the question is, according to what law of infinitely small distances (here equivalent to contact) an original repulsive force (the limitation of which consequently rests merely with the space in which it is diffused) acts at different distances, this force can still less be rendered apparent by divergent repulsive rays from the assumed repellant points, although the direction of the motion has it for a *terminus a quo*, because the space in which the force must be diffused, in order to act at a distance, is a corporeal space, which is to be conceived as filled. The manner in which this is done, how, namely a point can fill a space corporeally by moving force, that is dynamically, is certainly capable of no further mathematical demonstration, but, it is impossible for rays diverging from a point to render conceivable the repelling force of a corporeally-filled space. The repulsion, at various infinitely small distances, of these mutually repelling points, we could simply estimate in inverse proportion to the corporeal spaces which fill each of these points dynamically; in other words, as the cube of their distances from one another, without our being able to construct them.

4. Thus the original attraction of matter would act in inverse proportion to the square of the distance at all distances, the original repulsion in inverse proportion to the cube at infinitely small distances, and by such an action and reaction of both fundamental forces, matter as a definite degree of the filling of space would be possible; for, insomuch as the repulsion increases in greater degree with approach of the parts than the attraction, the limits of approach beyond which by given attraction no greater is possible, in other words the degree of compression which constitutes the amount of the intensive filling of space, is also determined.

Observation 2.

I readily see the difficulty of this mode of explaining the possibility of a matter in general, which consists in that, if a point cannot directly drive another by its repulsive force, without at the same time filling the whole corporeal space, up to the given distance by its force, this,

as it seems to follow, must contain several repulsive points, which contradicts the assumption, and was above refuted (proposition 4) under the name of a sphere of repulsion of the simple in space. But there is a distinction to be made between the conception of a real space, that can be given, and the mere idea of a space, simply conceived for the determination of the relations of given spaces, but which is in reality no space. In the case cited of a supposed physical monadology, there ought to be real spaces, to be filled from a point dynamically, namely, by repulsion, for they [the monads] existed as points, before any possible generation of matter from them, and defined by the proper sphere of their activity, the portion of the space to be filled, which could belong to them. In the hypothesis in question, therefore, the matter cannot be regarded as infinitely divisible and as *quantum continuum;* for the parts, directly repelling one another, have notwithstanding a determinate distance from one another (the sum of the diameter of the sphere of their repulsion) [while] on the contrary, when we, as really happens, think of matter as continuous quantity, no distance whatever of the directly repelling parts obtains, and consequently, no increasing or diminishing sphere of its immediate activity. Matters however can be expanded or compressed (like the air), and in this case we conceive a distance of their nearest parts as capable of increasing or diminishing. But because the nearest parts of a *continuous* matter touch one another, whether they are farther expanded or compressed, the distances from one another are conceived as *infinitely small*, and this infinitely small space, as filled in a greater or less degree by its force of repulsion. The infinitely small mediate space is not however distinguishable from contact, and thus it is only the idea of space, which serves to render intuitable the expansion of matter as continuous quality, but whether it is really *thus* cannot be conceived. When, therefore, it is said: the repulsive forces of the parts of matter immediately driving one another, stand in inverse proportion to the cube of their distances, this only signifies that they stand in inverse proportion to the corporeal spaces that are conceived between parts immediately touching one another notwithstanding, and

where distance must for this reason be termed *infinitely small*, in order that it may be distinguished from all real distance. Hence we must not from the difficulties of the construction of a conception, or rather, from its misapplication, cast any slur on the conception itself; for in that case it would touch the mathematical presentation of the proportion, with which the attraction occurs at different distances, no less than that whereby each point in an expanding or compressed whole of matter, directly repels the other. The universal law of dynamics would in either case be this: the effect of the moving force, exercised from one point upon every other outside it, is in inverse proportion to the space in which the same quantity of moving force has had to expand itself, in order to act directly upon this point at the determinate distance.

From the law that the parts of matter originally repel one another in inverse cubic proportion to their infinitely small distances, a quite different law of their extension and compression must necessarily follow to that of Mariotte [in respect] of the air; for this proves repulsive forces of its nearest parts, which stand in inverse proportion to their distances, as Newton demonstrates. (*Princ. Phil. Lat., Lib. II., Propos.* 23, *Schol.*) But the expansive force of the latter also cannot be regarded as the effect of *originally* repulsive forces, but rests on *heat*, which compels the proper constituents [viz. the molecules] of the air (to which moreover real distances from each other may be conceded) to fly from one another, not as a matter interpenetrating them, but, to all appearance through their vibrations. But that these vibrations of the parts nearest one another must communicate a repulsive force, standing in inverse proportion to their distances, may be made readily comprehensible by the laws of the communication of motion through the vibration of elastic matters.

I may explain that I do not wish the present exposition of the law of an original repulsion to be regarded as necessarily belonging to the object of my metaphysical treatment of matter, nor the latter (for which it is enough, to have presented the filling of space as dynamic property) to be mixed up with the disputes and doubts which might affect the former.

General Note to the Dynamics.

If we review all [our] discussions on the above, we shall observe that the following things have been taken into consideration: *Firstly*, the *real* in space (otherwise called the solid) in its filling through the *force of repulsion; Secondly*, what, in respect of the first, as the proper object of our external perception, is NEGATIVE, namely, the *force of attraction*, by which, so far as may be, all space is penetrated, [or], in other words, the solid, is wholly abolished; *Thirdly*, the LIMITATION of the first force by the second, and the thence resulting determination of the *degree of a filling* of space; [we shall observe] therefore that the *quality* of matter has been thoroughly dealt with, under the heads of *reality, negation, and limitation*, in so far as they belong to a metaphysical dynamics.

General Observation on Dynamics.

The universal principle of the Dynamics of material nature, that all [that is] real in the objects of our external sense, that, namely, which is not mere determination of space (place, extension and figure), must be regarded as moving force; by which, therefore, the so-called solid, or absolute impenetrability, is banished from natural science as an empty conception, and in its stead a repulsive force is posited; while the true and immediate attraction is defended against all the sophistries of a metaphysics that misunderstands itself, and is explained as a fundamental force necessary even to the possibility of the conception of matter. Now from this the consequence arises, that space, should it be found necessary, could be assumed as throughout, and at the same time in different degrees, *filled* even *without* distributing *empty mediate spaces* within the matter. For according to the originally varying degree of the repulsive forces on which is founded the first property of matter, namely, that of filling a space, its relation to the original attraction (whether of each matter for itself, or to the united attraction of all matter in the universe) is conceived as infinitely diverse, inasmuch as attraction rests on the mass of matter in a given space,

while its expansive force [rests] on the degree in which it fills it [viz., the space], which can be specifically very different (as for instance the same quantity of air, in the same volume, exhibits greater or less elasticity, according to its higher or lower temperature). The general ground of this is that by true attraction *all parts* of matter act directly *on all parts* of other matter, but through expansive force only those on the *surface of contact*, owing to which it is the same, whether behind this, much or little of the matter exists. From the above, however, a great advantage for Natural Science arises, by its being relieved of the burden of having to manufacture a world from fullness and emptiness, merely according to fancy, and being able rather to conceive all spaces as full, and yet as filled in varying amount, by which empty space at least loses its *necessity*, and is relegated to the rank of an hypothesis; whereas otherwise, under the pretext of being a necessary condition to the explanation of the varying degree of the filling of space, it might lay claim to the title of a principle.

With all this the advantage of a methodically-employed metaphysic to the detriment of equally metaphysical principles, but such as have not been subjected to the test of criticism, is apparently only *negative*. But indirectly, notwithstanding, the field of the investigator of Nature is extended, since the conditions, by which it previously limited itself, and whereby all original forces of motion were philosophised away, now lose their validity. But one must guard against going beyond what the universal conception of a matter in general renders possible, and seeking to explain its particular or specific definition and variety *à priori*. The conception of matter is reduced to mere moving forces, and this could not be expected to be otherwise, seeing that in space no activity—no change—can be thought of, except as motion. But who can comprehend the possibility of fundamental forces? They can only be assumed, if they inevitably belong to a conception of which it is demonstrable that it is a fundamental conception which cannot be deduced from any other (as that of the filling of space), and of this [nature] is the force of repul-

sion, and the opposing force of attraction, [considered] generally. We can indeed judge of this, their connection and consequences well enough *à priori*, whatever their relations among each other may be conceived to be, provided they do not contradict themselves; but [must] not lay claim to assume either of them as real, because to the admissibility of constructing an hypothesis, it is indispensably requisite that the *possibility* of what is assumed be quite *certain*, while with fundamental forces, their possibility can never be comprehended. And in this, the mathematico-mechanical mode of explanation has an advantage over the metaphysico-dynamical, which cannot be taken from it—namely, that from a completely homogeneous material, through the manifold form of the parts, by means of empty mediate spaces interspersed, it can accomplish a great specific mulitplicity of matters, in density no less than in mode of action (if foreign forces be superadded). For the possibility of the forces, as well as of the empty mediate spaces, admit of demonstration with mathematical evidence; on the other hand, if the matter itself be transformed into fundamental forces (to define the laws of which, *à priori*, we are not in a position, and still less to indicate confidently a multiplicity of the same, sufficient for the explanation of the specific variety of matter), all means are wanting for the *construction* of this conception of matter, and for presenting as possible, in intuition, what we conceived in general. But a mere mathematical physics, pays for the foregoing advantage doubly on the other side, in that it first of all lays at its foundation an empty conception (that is, absolute impenetrability), and secondly that it must give up all the *proper* forces of matter, in addition to its original configuration of the fundamental matter and interspersion of empty spaces, and, after having called forth the need for explanation, must concede more freedom to the imaginative faculty in the field of philosophy—[and concede it] indeed as legitimate claim—than is consistent with the caution of the latter.

Instead of an adequate explanation of the possibility of matter and its specific variety, from the fundamental forces, which I am unable to furnish, I shall, as I hope, present the momenta to which its specific variety must

admit of being reduced, completely in its totality *à priori* (although [I cannot] conceive its possibility in the same way). The observations inserted between the definitions will explain their application.

1. A BODY in a physical signification, is *a matter between definite boundaries* (which therefore has a figure). The space *between these boundaries considered as to its size*, is the CONTENT OF SPACE (*volume*). The degree of the filling of a space of definite content is termed DENSITY. Otherwise the expression *dense* is used absolutely, for that which is *not hollow* (bladdery, perforated). In this sense there is an absolute density in the system of absolute impenetrability, if a matter contains no empty mediate spaces. According to this conception of the filling of space comparisons are instituted, and one matter containing less emptiness within itself is called denser than another, till at last, that in which no part of the space is empty is termed perfectly dense. The latter expression can only be made use of, on the mere mathematical conception of matter, for in the dynamical system of a simply relative impenetrability there is no maximum or minimum of density, and any matter however thin can equally be termed fully dense if it wholly fill its space, without containing empty mediate spaces; in other words, if it be a continuum and not an interruptum; but it is in comparison with another [matter], less dense in a dynamical sense, if, although it fill its space wholly, it does not do so in an equal degree. Yet even in the latter system, it is awkward to conceive a relation of matters according to their density, unless they are represented as specifically homogeneous among one another, so that one can be generated from the other merely by mutual pressure. As now, the latter does not appear to be absolutely requisite to the nature of all matter in itself, no comparison can properly be made between heterogeneous matters in respect of their density, as for instance, between water and quicksilver, although this is commonly done.

II. *Attraction, in so far as it is merely conceived as active in contact*, is called COHESION [*zusammenhang*]. It is demonstrated by very good experiments, that the same force, called cohesion in contact, is found active at a very small distance; but attraction is only called cohesion,

in so far as I think of it only in contact, in accordance with common experience by which it is hardly perceived at small distances. Cohesion is commonly assumed as an altogether universal property of matter, not because we are led to it through the mere conception of a matter, but because experience presents it everywhere. But this universality must not be understood *collectively*, as though every matter, through this kind of attraction, acted *at the same time* on every other [matter] in the universe—in the same way as gravitation—but merely *disjunctively*, namely on one or the other, it does not signify what kind of matters they may be, that come in contact with it. For this reason, and since this attraction, as is demonstrable on various grounds, is not a penetrating but only a superficial force, inasmuch as it is not itself regulated on all sides according to the density—since to complete strength of cohesion a preceding state of fluidity of the matters and their subsequent solidification is requisite, and the closest contact of broken but hard matters in the same surfaces, with which they previously firmly cohered (as for instance a looking-glass where there is a crack), do not any longer admit the degree of attraction which they received on solidifying after their fluid [state—for this reason] I hold this attraction in contact to be no fundamental force of matter, but only a derivative one; of which more hereafter. *A matter whose parts, notwithstanding their strong cohesion among one another, can be impelled by every moving force—be it never so small—past one another, is* FLUID. *But parts of a matter are* IMPELLED *past one another, if, without diminishing the quantum of contact, they are obliged to change [places] among one another. Parts, in other words, matters, are* SEPARATED *if their contact is not merely changed with others but destroyed, or its quantum diminished. A* FIRM *—better a* SOLID*—body (corpus rigidum) is that whose parts cannot be impelled past one another by every force, and which consequently resist impulsion with a certain degree of force.*

The obstacle to the impulsion of matters past one another is FRICTION.

The resistance to *separation* of matters in contact is cohesion. Fluid matters, therefore, suffer no friction in their division; but where this is met with, the matters

are assumed as solid, in greater or less degree, of which the smallest is termed *adhesiveness* (*viscositas*), at least in its lesser parts. *The solid body is* BRITTLE, *if its parts cannot be impelled past one another without breaking*, in other words when its cohesion cannot be changed without being at the same time destroyed. The distinction between fluid and solid matters is very incorrectly placed in the different degree of the cohesion of their parts. For to call a body fluid does not depend on the degree of its resistance to rupture, but only on [its resistance] to the impulsion of its parts past one another. The former may be as great as one chooses, but the latter is always in a fluid matter = 0. Let us contemplate a drop of water. If a molecule within the same be drawn on one side, by never so great an attraction of the neighbouring parts, touching it, it will be drawn exactly as much toward the opposite side, and as the attractions reciprocally abolish their effects, the molecule is just as easily movable as if it existed in empty space. The force namely, which is to move it, has no cohesion to overcome, but only the so-called inertia which it would have to overcome with all matter, even if it did not cohere at all. A small microscopical animalcule would therefore move itself as easily within this drop as if there were no cohesion to overcome. For in reality it has not any cohesion of the water to abolish, nor to diminish its contact within itself, but only to change it. But conceive this animalcule as wanting to work its way through the outer surface of the drop; it is then first to be observed, that the reciprocal attraction of the parts of this drop of water cause them to move themselves, until they have attained the greatest contact among one another, in other words, the smallest contact with empty space, that is, have constituted a globular form. If now, the said insect be endeavouring to work its way beyond the surface of the drop, it must change this globular form, and consequently effect more contact of the water with the empty space and hence less contact of the parts among one another, that is, diminish its cohesion; and now for the first time the water resists it through its cohesion, though [even now] not within the drop, for here the contact of the parts among one another is in no way

lessened, but only changed in their contact with other parts, in other words, not separated, but only shifted. One may therefore, and indeed for similar reasons, apply to this microscopical animalcule, what Newton says of the light-ray; that it cannot be repelled through dense matter, but only through empty space. It is thus clear that the increase of the cohesion of the parts of a matter does not in the least affect its fluidity. Water coheres in its parts much more strongly than is commonly believed, when an experiment with a metal plate drawn off from the surface of the water is relied upon, which decides nothing, because the water does not split in the whole surface of the original contact, but from a much smaller surface resulting from the shifting of its parts, just as a stick of soft wax when a weight is suspended at the end, becomes gradually thinner, and is then torn off from a much smaller surface than the original one. What, however, is quite decisive with respect to our conception of fluidity is this, that *fluid* matters can be explained as *those of which every point seeks to move itself in all directions with the same force, with which it is impressed towards any one* [*in particular*]; a property, upon which the first law of hydro-dynamics rests, but which can never be attributed to an aggregation of smooth and at the same time solid particles, as a very slight removal of its pressure according to the laws of composite motion will show, and thereby prove the originality of the property of fluidity. If now the fluid matter should suffer the least hindrance to impulsion, in other words the smallest friction, this would grow with the strength of the pressure with which the parts were pressed against one another, and finally a pressure would obtain, by which the parts of this matter would not admit of impulsion past one another, by every small force. For instance, in a bent tube, [composed] of two pieces, of which the one may be as wide as one chooses, the other as narrow as one chooses, provided it is not a mere hair-tube—if one supposes both pieces to be some hundred feet high, the fluid matter in the narrow one would stand just as high as that in the wide, according to the laws of hydrostatics. But because the pressure on the bottom of the tubes, and hence on the part uniting both

these tubes (which stand in communication), can be conceived as in proportion to the heights increasingly greater to infinity, so, if the least friction between the parts of the fluid took place, a height of the tubes must be able to be found, by which a small quantity of water, poured into the narrow one, would not move that in the wide one out of its place, in short, [by which] the column of water in the latter would come to stand higher than that in the former, inasmuch as the lower parts, with such great pressure against one another, would not any longer admit of impulsion, by so small a moving force as the added weight of water—[a cohesion] which is opposed to experience, and even to the conception of the fluid. The same may be said if, instead of pressure by weight, the cohesion of the parts be posited, it matters not how great it may be. The second definition of fluidity cited, upon which the fundamental law of hydrostatics rests, namely, that it is the property of a matter by which every part of the same endeavours to move itself towards all sides with the same force with which it is impressed in a given direction, follows from the first definition, if the fundamental principle of universal dynamics be combined with it, that all matter is originally elastic, since it must endeavour to extend itself—that is (if the parts of a matter admit of being impelled past one another by every force without hindrance, as is actually [the case] with fluids), to move itself—towards all sides of the space in which it is compressed, with the same force with which the pressure in any [given] direction, whichever it may be, is exercised. There are therefore properly only the solid matters (the possibility of which requires another ground of explanation beside the cohesion of the parts), to which friction can be attributed, and the friction already presupposes the property of solidity. But why certain matters, although possessing not a larger, it may be even a smaller, force of cohesion, than fluid [matters], resist notwithstanding so powerfully the shifting of their parts, as not to admit of separation otherwise than by the abolition of the cohesion of all parts at once in a given surface, whereby the appearance of a pre-eminent cohesion is afforded—in short, how rigid bodies are possible—is still

an unsolved problem, in spite of the ease with which ordinary natural science believes itself to dispose of it.

3. ELASTICITY (spring-force) is the capacity of a matter, *to reassume its size or shape* [*which has been*] *altered by another moving force, on the cessation of the latter.* It is either *expansive* or *attractive* elasticity; the former in order after compression to assume the previously greater [volume], the latter in order after expansion [to assume] the previously smaller volume. The attractive elasticity, as the expression itself shows, is obviously derived. An iron wire stretched by weights appended, springs, if the connection is cut, back into its [original] volume. By virtue of this attraction, which is the cause of its cohesion (or with fluid matters, [as?] when the heat is suddenly withdrawn from quicksilver), their matter hastens to assume again the previous smaller volume. The elasticity which consists in rehabilitation of the previous figure, is always attractive, as in a bent sword-blade, where the parts on the convex side which are forced back, seek to recover their former proximity, and in the same way a small drop of quicksilver may be called elastic. But the expansive elasticity may be original or it may be derivative. Thus the air has a derivative elasticity, by means of the matter of heat which is most intimately united with it, and the elasticity of which is perhaps original. On the other hand, the fundamental material of the fluid which we term air, must nevertheless as matter generally already have elasticity in itself, which may be called original. Of what kind a perceived elasticity may be, is not possible to decide with certainty in cases as they arise.

4. *The effect of moved bodies on one another through the communication of their motion is termed* MECHANICAL; *but that of matters, in so far as they change the combination of their parts reciprocally by their own forces while at rest, is termed* CHEMICAL. This chemical influence is termed SOLUTION [*auflösung*] in so far as *it has for its effect the separation of the parts of a matter;* (mechanical division, as for instance a wedge driven between the parts of a matter, is thus, since the wedge does not act by its own force, entirely different from chemical [division]); but that which has for its effect the severance of two matters resolved by one another, is [chemical]

ANALYSIS. The solution of specifically distinct matters by one another, in which no part of the one is met with, that is not united with a part of the other specifically distinct from it in the same proportion as the whole, is *absolute solution*, and may also be termed *chemical penetration*. Whether the resolving forces really discoverable in nature, are capable of effecting a complete solution may remain undiscussed. Here the question is only whether such admit of being conceived. Now it is obvious that so long as the parts of a resolved matter are still particles (*moleculæ*), a solution of them is not less possible than of the larger, indeed that this must really proceed, if the resolving force continue, until there is no part left, that is not compounded of the medium of solution and the matter to be resolved in the proportion in which they each stand to one another in the whole. As, then in such a case, there can be no part of the volume of the solution, not containing a part of the resolving medium, this must also, as a continuum, completely fill the volume. In the same way, as there can be no part of this volume of solution, that does not contain a proportional part of resolved matter, this must also, as a continuum, fill the whole space, constituting the volume of the mixture. But when two matters, each of them, entirely fill one and the same place, they *penetrate* one another; hence a perfect chemical solution would be a penetration of the matter, which nevertheless would be wholly distinguished from the mechanical, inasmuch as by the latter it would be conceivable that with the greater approach of moved matters, the repulsive force of the one might entirely counterbalance that of the other, and one or both reduce its extension to nothing. On the contrary, here, the extension remains, only that the matters [are] not outside, but within one another, i.e. occupy by *intersusception* (as it is usually termed) together a space equal to the sum of their densities. Against the possibility of this perfect solution, and hence of chemical penetration, it is difficult to allege anything, although it involves a *complete* division to infinity, for this in the present case contains no contradiction, as the solution takes place continuously throughout time; in other words, through an infinite series of moments,

with acceleration; by the division moreover, the sums of the outer surfaces of the matters yet to be divided, grow, and as the resolving force acts continuously, the whole solution may be completed in an *assignable* time. The incomprehensibility of such a chemical penetration of two matters is to be ascribed to the score of the incomprehensible [nature] of the divisibility to infinity of every continuum, generally. If we depart from this complete solution we must assume it to extend only to certain small particles of the matter to be resolved, which swim in the medium of solution at fixed distances from each other, without our being able to assign the least ground why these particles, as they are still divisible matters, may not in the same way be resolved. For that the medium of solution does not act farther, may always, in nature, so far as experience reaches, be time enough; but the question here is of the possibility of a resolving force, which may resolve this particle, and every other that remains over, till the solution is completed. The volume occupied by the solution may be equal to the sum of the spaces occupied by the mutually resolving matters before the mixture, or [it may be] smaller or larger, according to the relation in which the attractive forces stand to the repulsions. They constitute in solution, each for itself and both combined, *an elastic medium*. This *alone*, will afford a sufficient reason why the resolved matter does not by its weight separate itself again from the resolving medium. For the attraction of the latter, as it occurs with equal strength toward all sides, abolishes its resistance, and to assume any adhesiveness in the fluid, does not harmonise with the great force exercised by such resolved matters, as for instance, acids diluted with water, on metallic bodies, on which they do not merely rest, as must happen if they simply swam in their medium, but which separate themselves from each other with great attractive force, and diffuse themselves in the whole space of the vehicle. Admitting, moreover, that art has no chemical forces of solution of this kind, capable of effecting a complete solution, in its power, nature might still exhibit them in its vegetal and animal operations and thereby perhaps generate matters, which although indeed mixed, no art could

again separate. This chemical penetration might even be met with, where one of the two matters might not be severed by the other, and in a literal sense resolved; as for instance, heat-matter penetrates bodies, since if it only distributed itself in their empty mediate spaces, the solid substance itself would remain cold, since it could not absorb any of it. In the same way, an apparently free passage of certain matters through others could be conceived in such a manner as that of magnetic matter, without preparing for it, to this end, open pores and empty mediate spaces, in all, even the densest matters. But this is not the place to point out hypotheses for special phenomena, but only the principle according to which they are all to be judged. Everything that relieves us of the necessity of having recourse to empty spaces, is a real gain to natural science. For these give far too much freedom to the imagination, to supply the want of accurate knowledge of nature by fancy. Absolute vacuity and absolute density are, in natural science, much the same as blind chance and blind fate in metaphysical science, namely, stumbling-blocks for the investigating reason, by which, either fancy occupies its place, or it is lulled to rest on the pillow of occult qualities.

But as concerns the procedure in natural science in respect of the most important of all its problems, namely, the explanation of a possible *specific variety of matters* [extending] to infinity, one can only strike out two ways: the *mechanical*, by the union of the absolutely full with the absolutely empty, or a *dynamical* way, opposed to it, by explaining all varieties of matters through the mere variety in the combination of the original forces of repulsion and attraction. The first has, as the materials of its deduction, *atoms* and *the void* [emptiness]. An atom is a small portion of matter physically indivisible. A matter is physically *indivisible*, whose parts cohere with a force, capable of being overpowered by no discoverable moving force in Nature. An atom, in so far as it is specifically distinguished from others by its figure, is called a *primal body*. A body whose moving force depends on its figure is called a *machine*. The mode of explanation of the specific variety of matters by the construction and composition of their smallest parts

as machines is *mechanical natural philosophy*, but that which derives the specific variety of matter from matters not as machines, that is, mere tools of external moving forces, but from the moving forces of attraction and repulsion originally belonging to them, may be called *dynamical natural philosophy*. The mechanical mode of explanation, as it is the most available in mathematics, has, under the name of the atomistic or corpuscular philosophy, always retained its reputation and influence on the principles of natural science, with little change from old Demokritos to Descartes, and even our own times. It consists essentially in the presupposition of the *absolute impenetrability* of the primitive matter, in the *absolute homogeneity* of this matter, differences only being admitted in the figure, and in *the absolute unconquerability* of the cohesion of the matter of these fundamental bodies themselves. Such were the *materials* for the generation of specifically different matters, in order not only to have at hand an unchangeable, and at the same time variously-formed fundamental material for the unchangeableness of species and kinds, but also from the form of these primal parts, as machines (to which nothing more than an externally impressed force was wanting), to explain the several effects of nature *mechanically*. The first and most important credential of this system rests, however, on the pretended unavoidable *necessity* of employing *empty spaces* for the *specific distinction of the density* of matters which were assumed as distributed within the matters and between the said particles in [such] proportion as was found necessary, for the sake of some phenomena so large, that the filled part of the volume, even of the densest matter, would be well nigh as nothing, against the empty. In order, now, to introduce a dynamical mode of explanation (which is far more suited and more advantageous to experimental philosophy, inasmuch as it leads directly to the discovery of the proper moving forces of matters and their laws, while it limits the freedom of assuming empty mediate spaces and fundamental bodies of definite figures, neither of which admit of definition or discovery by any experiments) it is by no means necessary to forge new hypotheses, but merely to refute the postulate of the mechanical mode of explanation [namely] *that it is*

impossible to conceive a specific distinction of the density of matters without the intermixture of empty spaces, by the mere citation of a way in which this admits of being conceived without contradiction. For if the postulate in question, on which the mere mechanical mode of explanation stands, be only first declared invalid, as a fundamental principle, it is self-evident that it must not be adopted as a hypothesis in natural science, so long as a possibility remains of conceiving the specific distinction of densities without any mediate spaces. But this necessity rests upon [the fact] that matter does not (as mere mechanical investigators of nature assume) fill its space by absolute impenetrability, but by repulsive force, which has its degree, that may be different in different matters, and as it has nothing in itself, in common with the attractive force, which is regulated by the quantity of the matter, it may be *originally different* in degree, in different matters with the same attractive force; and consequently the degree of extension of these matters may with the same quantity of matter, and conversely, the quantity of matter with the same volume—i.e., density—admit of very great original specific differences. In this way we should not find it impossible to conceive a matter (as, for instance, the ether is represented), which wholly filled its space, without any void, and yet with incomparably less quantity of matter, at an equal volume, than any bodies which we can subject to our experiments. The repulsive force in ether must, in relation to its proper attractive force, be conceived as incomparably greater than in any other matter known to us. And the only [reason] why we merely assume it, *because it can be conceived*, is as a foil to a hypothesis (that of empty spaces), which is alone supported by the pretension, that such [viz., matter] *does not admit of being conceived* without empty spaces. Besides this, no law whatever of the attractive or repulsive force may be risked on *à priori* conjectures, but everything, even the universal attraction as cause of gravity must, together with its laws, be inferred from data of experience. Still less may such be attempted with chemical affinities, otherwise than by way of experiment. For it lies generally beyond the horizon of our Reason, to comprehend

original forees *à priori* as to their possibility; all natural philosophy consists rather in the reduetion of given forees in appearance diverse, to a small number of forees and powers, adequate to the explanation of the effeets of the former, but which reduetion only extends to fundamental forees, beyond whieh our Reason eannot proeeed. And thus, metaphysieal researeh, behind what lies at the foundation of the empirieal eoneeption of matter, is only useful for the purpose of leading natural philosophy so far as is possible to the investigation of dynamieal grounds of explanation, as these alone admit the hope of definite laws, and eonsequently of a true rational eoherence of explanations.

This is all that metaphysies can ever aeeomplish to the eonstruetion of the eoneeption of matter—in other words, for the application of mathematies to natural seienee, in respeet of properties whereby matter fills its spaee in definite amount—namely, to regard these properties as dynamieal and not as uneonditioned original positions, sueh for instanee, as a mere mathematieal treatment would postulate.

The well-known problem as to the admissibility of empty spaces in the world may furnish the eonelusion. The *possibility* of this does not admit of dispute. For to all forees of matter spaee is requisite, and, as it also contains the eonditions of the laws of its diffusion, is neeessarily pre-supposed before all matter. Thus, attraetive force is attributed to matter, in so far as it *occupies* a spaee around itself by attraetion, without, at the same time, *filling* it, whieh, therefore, even where matter is aetive, may be eonceived as empty, beeause it is not active by repulsive forees, and henee does not fill it. But, to assume empty spaees as *real*, no experienee, inferenee from [experienee], or hypothesis neeessary to its explanation, ean justify us. For no experience gives us any but eomparatively empty spaees to eognise, whieh ean be perfectly explained, from the property of matter, as filling its spaee by an expansive foree, greater or progressively smaller to infinity, in all possible degrees, without requiring empty spaees.

THIRD DIVISION.

METAPHYSICAL FOUNDATIONS OF MECHANICS.

Explanation 1.

Matter is the movable, in so far as it is something having a moving force.

Observation.

Now this is the third definition of a matter; the mere dynamical conception could also regard matter as in rest; the moving force, which was then taken into consideration, concerned merely the filling of a particular space, without our being permitted to regard the matter which filled it, as itself moved. Repulsion was thus an original moving force to *impart* motion; in mechanics, on the contrary, the force of a matter, set in motion, is considered as [present] in order *to communicate* this motion to another. But it is clear that the movable would have no moving force *through its motion* if it did not possess original moving forces, whereby it is active before all proper motion, in every place in which it exists, and that no matter would impress uniform motion upon another matter, the motion of which lay in the path of the straight line *before it*, if both did not possess original laws of repulsion; nor that it could compel another by its motion, *to follow it* in the straight line (that it could drag it after it), if both did not possess attractive forces. Thus, all mechanical laws presuppose dynamical, and a matter as moved can have no moving force, except by means of its repulsion or attraction, upon which, and with which, it acts directly in its motion, and thereby communicates its own motion to another. It will be observed that I do not make further mention here of the communication of motion by attraction—for instance, as if a comet of stronger attractive capacity than the earth, in passing by the latter, should drag it after it—but only

of the mediation of repulsive forces, in other words, of pressure (as by means of a distended spring), or by impact, since, without this, the application of the laws of the one to those of the other is only different in the line of direction, but otherwise the same in both cases.

Explanation 2.

The quantity of the matter is the multitude of the movable in a definite space. This, in so far as all its parts may be considered as at the same time active (moving) in their motion is termed the *mass*, and it is said a matter *acts in mass* when all its parts are moved in the same direction, exercising, *at the same time*, their moving force, outside themselves. A mass of definite figure is called a *body* in a mechanical sense). The quantity of motion (mechanically estimated) is that which is estimated at once, by the quantity of the moved matter and its velocity; *phoronomically* it consists merely in the degree of the velocity.

Proposition 1.

The quantity of the matter may be estimated, in comparison, with every other, only by the quantity of motion at a given velocity.

Demonstration.

Matter is divisible to infinity; consequently none of its quantity can be determined directly *by a multitude* of its parts. For if this occur in the comparison of the given matter, with a homogeneous one, in which case the quantity of the matter is proportional to the quantity of the volume, this is opposed to the requirements of the proposition [which says], it is to be estimated in comparison with every other (even specifically different) [matter]. Thus matter can be neither indirectly nor directly estimated in comparison *with every other matter*, so long as abstraction is made of its own motion. Consequently, no other universally valid measure of it remains, but the quantity of its motion. But in this, the difference of the motion, which rests on the different

quantity of the matter, can only be given when the velocity is assumed as equal among the compared matters, therefore, &c.

Note.

The quantity of the motion of bodies is in compound proportion to the quantity of its matter and its velocity, i.e., it is the same whether I make the quantity of the matter of a body doubly as great, and retain the velocity, or whether I double the velocity and retain the mass. For the definite conception of a quantity is only possible through the construction of the quantum. But this is, in respect of the conception of the quantity, nothing but the composition of the equivalent; and consequently the construction of the quantity of a motion is the composition of many motions equivalent to each other. Now it is the same thing, according to the phoronomic propositions, whether I impart to a movable a certain degree of velocity, or to many equal movables all the smaller degrees of velocity, produced by the given velocity being divided by the multitude of the movable. Hence arises, at first, an apparently phoronomic conception of the quantity of a motion, as compounded of many motions outside one another, but yet as a whole united in a movable point. If now this point be conceived as something possessing moving force *by its motion*, there arises the mechanical conception of the quantity of the motion. But in phoronomy it is not practicable to conceive of a motion as compounded of many parts *outside one another*, because the movable, since it is conceived as without any moving force, gives no distinction in real quantity of the motion, no matter with how many others of its kind it be compounded, beyond that which consists merely in the velocity. As the quantity of the motion of a body to that of another, so is related also the quantity of its effect, the *whole* effect being understood thereby. Those who assumed merely the size of a space filled with resistance (e.g., the height to which a body can rise with a given velocity against gravitation or the depth to which the same [body] can penetrate into soft matters) as the measure of the whole effect, brought forward another law

of moving forces *with real* motions, namely, that of compound relation, from [the law] of the quantity of the matters and of the squares of their velocities; but they overlooked the quantity of the effect in the given time, in which the body traverses its space with less velocity, and this can alone be the measure of a motion exhausted by a given uniform resistance. Hence no difference can obtain between living and dead forces, if moving forces are considered mechanically, that is, as those such as bodies possess, in so far as they are themselves moved, it matters not whether the velocity of their motion be finite or infinitely small (mere effort towards motion). One might far more suitably indeed call those forces with which matter (even when abstraction is wholly made of its own proper motion, or even effort to move itself), acts on others; in other words, the original moving forces of dynamics, dead forces, and all mechanical [forces], that is, forces moving by their own motion, living forces, regard not being given to the difference of velocity, the degree of which may be infinitely small; always supposing that these designations of dead and living forces deserve to be retained at all.

Observation.

In order to avoid diffuseness, we will condense the explanation of the preceding three paragraphs into one observation.

That the quantity of the matter can only be conceived as the multitude of the movable (outside one another), as the definition expresses it, is a remarkable and fundamental proposition of universal mechanics. For it is indicated thereby, that matter can have no other quantity than that which consists in the multitude of the manifold *outside one another;* consequently no degree of moving force with given velocity that would be independent of this multitude, and which could be conceived as merely intensive quantity, which would certainly be the case if the matter consisted of monads, whose reality in every connection must have a degree, that might be greater or smaller, without depending on a multitude of parts external to one another. As to that which concerns the conception of

mass in the same explanation it cannot be regarded, as is usually [done], as the same as the quantity. Fluid matters can act by their own motion in mass, and they can also act in flux. In the so-called water-hammer the water in striking acts in mass, that is, with all its parts at the same time; the same occurs in water which has been enclosed in a vessel, and which presses by its weight upon the scale on which it stands. On the other hand, the water of a mill-stream acts on the paddle of the water-wheel that strikes it, not in mass, that is, at the same time with all its parts that rush against it, but only successively. If therefore, in this case, the quantity of the matter that is moved with a certain velocity, and that has moving force, is to be determined, one must first of all seek the *body of the water*, that is, such quantity of matter, that when it acts in mass with a certain velocity (by its weight) can produce the same effect. Hence by the word *mass* is generally understood the quantity of the matter of a solid body (the vessel, in which a fluid is enclosed, taking the place of its solidity). Finally, as concerns the proposition, together with the appended note, there is nothing strange that according to the former, the quantity of the matter has to be estimated by the quantity of the motion with given velocity, while according to the latter, on the contrary, the quantity of the motion (of a body, for that of a point, consists only in the degree of the velocity) at the same velocity, by the quantity of the moved matter, though this seems to revolve in a circle, and to promise no definite conception of either the one or the other. This supposed circle would indeed be real if it were a reciprocal deduction of two identical conceptions from one another. It contains, however, on the one side only the explanation of a conception, and on the other its application to experience. The quantity of the movable in space is the quantity of the matter; but this quantity of the matter (the multitude of the movable), *demonstrates itself* in experience only by the amount of the motion, at equal velocity (e.g. by equilibrium.)

It remains yet to be observed, that the quantity of matter is the *quantity of substance* in the movable; consequently, not the amount of a given quality of the same

(of repulsion or attraction, as has been said in the dynamics), and that the quantum of the substance is here nothing else than what is signified by the multitude of the movable, which constitutes matter. For only this multitude of the moved can with the same velocity give a difference in the amount of the motion. But that the moving force a matter possesses in *its own* motion can alone prove the quantity of the *substance*, rests on the conception of the latter as the *ultimate subject* (that is no further predicate of another) in space, which for this reason can have no other quantity, but that of the multitude of the homogeneous out-side one another. But as the *proper motion* of matter is a predicate which determines its subject (the movable), and in a matter, as a multitude of the movable, indicates the plurality of the moved subjects (at equal velocity in the same kind)—while with dynamical properties, whose quantity may be also the quantity of the effect of a single subject (e.g. a [single] molecule of air may have more or less elasticity), this is not the case—it is clear that the quantity of the substance in a matter can only be estimated mechanically, that is, by the amount of its motion, and not dynamically, by the amount of its original moving forces. In the same way the *original attraction*, as the cause of universal gravitation can afford a measure of the quantity of matter and its substance (as really happens in the comparison of matters by weighing), although in this case, not proper motion of the attracting matter, but a dynamical measure, namely attractive force, seems to be laid at the foundation. But inasmuch as with this force the effect of a matter occurs with all its parts, directly on all parts of another, and thus (at equal distances) is obviously proportioned to the multitude of the parts, and the attracting body itself thereby imparts a velocity of its own motion (by the resistance of the attracted [body]), which, in similar external circumstances, is exactly proportioned to the multitude of its parts, [for this reason] the estimate takes place here, [also] as a matter of fact, mechanically, although only indirectly so.

PROPOSITION 2.

First law of mechanics.—With all changes of corporeal nature, the quantity of the matter remains, on the whole, the same, unincreased and undiminished.

Demonstration.

(From universal metaphysics the proposition is laid at the foundation, that with all changes of nature, no substance can either arise or be annihilated, and here it is only demonstrated what is substance in matter.) In every matter the movable in space is the ultimate subject of all the accidents inhering in matter, and the multitude of this movable outside one another the quantity of the substance. Thus the amount of the matter as substance, is nothing other than the multitude of the substances of which it consists. Hence the quantity of the matter cannot be increased or diminished except by new substance arising or being annihilated. Now, with all change of matter, substance never arises or is destroyed; thus the quantity of matter is thereby neither increased nor diminished, but remains always the same as a whole, that is, so that somewhere in the world it continues [to exist], although this or that [particular] matter may by the addition or subtraction of its parts be increased or diminished.

Observation.

The essential, characterising *substance* in this demonstration, which is only possible in space and according to the conditions of the same, consequently as object of the *external* sense, is that its amount cannot be increased or diminished, without substance arising or being annihilated; therefore as any quantity of a merely possible object in space must consist *of parts outside one another*, these, if they are real (something movable) must be necessarily substances. That, on the contrary, which is considered as object of the internal sense may have a quantity as substance, *not consisting of parts outside one another*, whose parts are therefore not substances, whose origination or annihilation therefore need not be the

origination or annihilation of a substance, and hence whose increase or diminution is possible, notwithstanding the principle of the permanence of substance. Thus consciousness, in other words, the clearness of the presentations of my soul, and in consequence of this also, the faculty of *consciousness*, apperception, and therewith even the substance of the soul, has a *degree* that may be greater or smaller, without, to this end any substance requiring to arise or to be annihilated. But because with the gradual diminution of this faculty of apperception, a total disappearance of the same could not but finally result, the substance of the soul would still be subjected to a gradual destruction, even were it of simple nature, inasmuch as this disappearance of its fundamental force could not result through division (separation of substance from a composite), but, as it were, by extinction, and even this not in a moment, but by the gradual failing of its degree, from whatever cause arising. The *ego*, the universal correlate of apperception and itself merely a thought, indicates as a mere prefix, a thing of undefined signification, namely, the subject of all predicates without any condition distinguishing this presentation of the subject from a something generally, in short, substance, of which no conception of what it is [is conveyed] through this expression. On the contrary, the conception of a matter as substance is the conception of the movable *in space*. It is no wonder therefore, if permanence of substance can be proved of the latter, but not the former, since with matter it follows from its *conception*, namely, as being the movable, which is only possible in space, that that which possesses quantity in it, contains a plurality of the real *outside one another*, in other words of substances, and consequently its quantity can only be diminished by division, which is no disappearance, and even the latter would be impossible in this case according to the law of permanence. The thought *I* is on the contrary, *no conception*, but only inward perception; from it therefore nothing whatever can be deduced (except the complete distinction of an object of the internal sense from that which is merely conceived as object of external sense), and consequently not the permanence of the soul as substance.

PROPOSITION 3.

Second law of mechanics.—All change of matter has an external cause. (Every body remains in its state of rest or motion in the same direction and with the same velocity, if not compelled by an external cause to forsake this state.)

Demonstration.

(From universal metaphysics the proposition that all change has a cause, is laid at the foundation; here it only remains to be proved of matter, that its change must always have an *external cause.*) Matter, as mere object of the external sense, has no determinations but those of external relation in space, and hence is subject to no change except through motion. In respect of this, a change of one motion with another, or of the same with rest, and conversely, a cause of the same though this, must be traceable (according to principles of metaphysics). But this cause cannot be internal, for matter has no absolutely internal determinations and grounds of determination. Hence all change of a matter is based upon external causes (i.e., a body continues, &c.).

Observation.

This mechanical law can only be called the law of *inertia* (*lex inertiæ*); the law that every action has an equal reaction opposed to it, cannot bear this name. For the latter says what matter does, but the former, only what it does not do, which is better adapted to the expression inertia. The inertia of matter is and means nothing but its *lifelessness*, as matter in itself. *Life* means the capacity of a *substance*, to act from an *internal principle*, determining a *finite substance* to change, and a *material substance* to rest or motion, as change of its state. Now we know no other internal principle of a substance to change its state but *desire*, and no other internal activity whatever but *thought*, with that which depends upon it, *feeling* of pleasure or pain, and *impulse* or will. But these grounds of determination and action in no wise belong to the presentations of the external sense, and thus not to the determinations of matter as matter.

Thus all matter as such is *lifeless*. The proposition of inertia says so much and no more. If we seek the cause of any change of matter whatsoever in life, we shall have to seek it at once in another substance, distinct from matter, although bound up with it. For in natural knowledge it is necessary, first of all, to know the laws of matter as such, and to clear them from the admixture of all other efficient causes, before connecting them therewith, in order to distinguish how each acts for itself alone. On the law of inertia (next to that of the permanence of substance) the possibility of a natural science proper entirely rests. The opposite of the first, and therefore the death of all natural philosophy, would be *hylozoism*. From the same conception of inertia as that of mere *lifelessness*, it follows of itself, that it does not signify a *positive effort* to maintain its state. Only living beings can be termed inert in this latter sense, inasmuch as they have a conception of another state, which they dread and strive against with all their might.

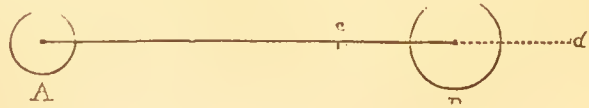
Proposition 4.

Third mechanical law.—In all communication of motion, action and reaction are always equal to one another.

Demonstration.

(From universal metaphysics the proposition must be borrowed, that all external action is *reciprocal action*. In this place it only has to be shown in order to remain within the bounds of mechanics that this reciprocal action (*actio mutua*) is at the same time *reaction* (*reactio*); but, without doing violence to the completeness of the insight, the above metaphysical law of community nevertheless cannot be left out here. All *active* relations of matters *in space*, and all changes of these relations, in so far as they can be *causes* of certain effects, must always be conceived as reciprocal, that is since all change of the same is motion, no motion of a body, with reference to an *absolutely-resting* [one] which would be thereby set in motion, can be conceived; but the latter must rather be conceived as only *relatively-resting* in respect of the space, to which it is referred, but together with this space as moved in the

opposite direction with the same quantity of motion in absolute space, as the moved [body] has against it, in the same space. For the change of relation (in other words, the motion) is completely reciprocal between both; by as much as the one body approaches every part of the other, by so much the other approaches every part of the first. And because here the question is not as to the empirical space surrounding both bodies, but only of the line lying between them (inasmuch as these bodies are considered simply in mutual relation, according to the influence, which the motion of the one can have on the change of state of the other, by abstraction of all relation to empirical space), their motion will be regarded as merely determinable in absolute space, in which each of the two bodies must have an equal share of the motion attributed to the one in relative space, since there is no ground for ascribing more to one of them than to the other. On this footing the motion of a body, *A*, against another, resting, *B*, with regard to which it may be moving if reduced to absolute space—that is, as the relation of active causes merely referred to one another—is so considered that each has an equal share in the motion, which in the phenomenon is attributed to the body *A* alone. This cannot occur otherwise, than by the velocity attributed to the body *A* in the relative space, being distributed between *A* and *B* in inverse proportion to the masses, to *A* only what belongs to it in absolute space, to *B*, on the other hand, *the relative, in addition*, in which it rests, in the opposite direction, whereby the same phenomenon of motion is completely retained, the effect in the community of both bodies being constructed in the following manner:



Let a body *A* be in motion with a velocity = *AB* in respect of the relative space towards the body *B*, which in respect of the same space is resting. Let the velocity *AB* be divided into two parts, *Ac* and *Bc*, which are related to one another inversely as the masses *B* and *A*. Conceive *A* as moved with the velocity *Ac*, in absolute

space, but B with the velocity Bc, in the opposite direction, *together with* the relative space; both motions are then opposite and equal to one another, and as they reciprocally destroy one another, both bodies are translated with reference to one another, that is, in absolute space, into [a state of] rest. B, however, was in motion with the velocity Bc in the direction BA, which is exactly opposed to that of the body A, namely AB, *together with the relative space.* If then the motion of the body B is destroyed by impact, the motion of the relative space is not therefore also destroyed. Thus, after the impact, *the relative space* moves in respect of both bodies A and B (which now rest in absolute space) in the direction BA with the velocity Bc, or, which is the same thing, both bodies move after the impact with equal velocity, $Bd = Bc$, in the direction of the impacting AB. According to the foregoing, however, the quantity of the motion of the body B in the direction and with the velocity Bc, and hence also that in the direction Bd with the same velocity, is equal to the quantity of the motion of the body A with the velocity and in the direction Ac. Consequently the effect, namely, the motion Bd, which maintains the body B by impact in relative space, and therefore the action of the body A with the velocity Ac, is always equal to the reaction Bc. Since this law (as mathematical mechanics teaches) suffers no alteration, when instead of the impact of a resting, an impact of the same body in the same way on a moved body is assumed; similarly as the communication of motion by impact, is only distinguished from that by traction by the direction in which the matters resist one another in their motion, it follows that *in all communication of motion* action and reaction are always equal to one another (that no impact can communicate the motion of a body to another except by means of an equal counter-impact, no pressure except by means of an equal counter-pressure, and in the same way no traction except by means of an equal counter-traction).*

* In Phoronomy, as the motion of a body in respect of its space, was considered as change of relation *in the same*, it was quite indifferent whether I sought to ascribe to the body in space—or instead

Note 1.

From the above there follows, the natural, and for universal mechanics, not unimportant law, that every body, however great its mass may be, must be *movable* by the impact of every other, however small its mass or velocity may be. For to the motion of A in the direction AB, there corresponds necessarily an equal opposite motion of B in the direction BA. Both motions destroy one another in absolute space by impact. But thereby both bodies retain a velocity $Bd = Bc$ in the direction of the striking [one]; consequently the body B is movable by even the smallest force of impact.

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thereof to the relative space—an equal but opposite motion. Both give fully the same phenomenon. The quantity of the motion of the space was merely the velocity, and hence that of the body was similarly nothing but its velocity (for which reason it could be conceived as a mere movable point). But in Mechanics, since a body is conceived as in motion toward another, respecting which it has a *causal relation* through its motion—namely that of moving itself, inasmuch as either by its approach by the force of impenetrability or its retreat by the force of attraction, it comes into community with it—then it is no longer indifferent, whether I seek to attribute to this body or to the space, an opposite motion. For now another conception of the quantity of motion comes into play, namely not only that merely conceived in respect of the space and only consisting in the velocity, but that whereby at the same time, the quantity of the substance (as moving cause) must be taken into consideration; and it is here no longer optional, but *necessary*, to assume both bodies as moved, and [moved] with an equal quantity of motion in an opposite direction; but when the one relative in respect of space is at rest, to attribute to it, *together with the space*, the requisite motion. For one cannot act on the other by its own motion, unless, through approach by means of repulsive force, or at a distance by means of attraction. As now both forces always act equally and reciprocally in opposite directions, no body can act by means of it, through its motion, on another, except precisely in so far as the other reacts with equal quantity of motion. Thus no body can impart motion through its motion to an *absolutely resting* [*body*], but this [latter] must be moved (together with the space) in an opposite direction to that which it is to maintain by the motion and in the direction of the former. The reader will easily perceive, that apart from the unusual [character] which this conception of the communication of motion has in itself, it admits of being placed in the clearest light, if one is not afraid of the diffuseness of the exposition.

Note 2.

This, then, is the *mechanical law* of the equality of action and reaction, which is based upon [the fact] that no *communication* of motion takes place except in so far as a *community* of these motions is pre-supposed, and thus that no body strikes another, which is at rest *in respect of itself*, but that if it be so in respect of the space, it is only in so far as *together with this space* it is moved in equal degree, but in contrary direction to the motion, falling to the relative share of the former, [both together] giving the quantity of the motion to be attributed to the former, in absolute space. For no *motion* which is [conceived as] moving in respect of another body, can be absolute; but if it be relative in respect of the latter, there is no relation in space that is not reciprocal and equal. But there is yet another, namely, a *dynamical* law of the action and reaction of matters not in so far as one *communicates* its motion to another, but *imparts* it to the latter originally, and by its resistance at the same time produces it in itself. This may be readily demonstrated in a similar way. For if the matter A attract the matter B, it *compels* the latter to *approach* it, or, which is the same thing, the former *resists the force* with which the latter strives to retreat. But inasmuch as it is the same thing whether B retreats from A or A from B, this resistance is at the same time a resistance that the body B exercises against the body A in so far as it strives to retreat, and hence traction and countertraction are equal to one another. In the same way, if A repel the matter B, A resists the *approach* of B. But it is the same thing whether B approaches A, or A B, for B resists just as much the approach from A, hence pressure and counter-pressure are always equal to one another.

Observation 1.

This, then, is the construction of the communication of motion, which at the same time carries with it as its necessary condition the law of the equality of action and reaction, which Newton did not trust himself to prove *à priori*, but for which we appealed to *experience*, and

for the sake of which others introduced into natural science a special force of matter under the name *force of inertia* (*vis inertiæ*) first invented by Kepler, and thus, in the end, also deduced it from experience; while finally others again placed it in the conception of a mere communication of motion which they regarded as a gradual transference of the motion of one body into the other, whereby the moving sacrificed precisely as much as it imparted to the moved until it impressed the latter no longer (when, namely, it had arrived at equality of velocity in the direction of it).* In this way all reaction, that is, all really reacting force of the one struck against the striking [body], (such for instance as would be possible to distend a spring) is abolished; and besides that it fails to prove what is really meant by the law referred to, in nowise explains the *communication* of motion itself, as to its possibility. For the word *transference* of motion from one body to another explains nothing, and if one is unwilling to take it, so to speak literally ([as being] opposed to the principle, *accidentia non migrant e substantiis in substantias*) as though motion were poured from one body into the other, as water from one glass into the other, the problem

* The equality of the action with the, in this case, falsely-called reaction, appears just as much, when under the hypothesis of the *transfusion* of motions, from one body into the other, the moved body *A* is allowed to transmit its entire motion in one moment to the resting [body], so that it would rest after the impact, a case that would be inevitable, as soon as both bodies were conceived as *absolutely hard* (a property which must be distinguished from elasticity). But as this law of motion could not be made to coincide in its application either with experience or with itself, nothing else remained to be done but to deny the existence of absolutely hard bodies, which was equivalent to confessing the contingency of this law, inasmuch as it ought to rest on the special quality by which matters move one another. In our presentation of this law, on the other hand, it is quite the same whether bodies that strike one another are considered absolutely hard or not. But how the *transfusionists* of motion can explain the motion of elastic bodies by impact in their way is quite incomprehensible to me. For it is clear that resting bodies do not, as merely resting, acquire motion, which the striking body sacrifices, but that in the impact real force is exercised in the opposite direction against the striking [body], in order as it were to compress the *springiness* between both, which to this end from its side demands as much real motion (although in the opposite direction) as the moving body on its side.

is, how to make this possibility—the explanation of which rests precisely on the same ground, whence the law of the equality of action and reaction is derived—comprehensible. One cannot conceive how the motion of a body A is necessarily connected with the motion of another B, except that forces are conceived in both, as accruing to them before all motion (dynamically)—as for instance repulsion—and it can be proved, that the motion of the body A through approach towards B, with the approach of B towards A, and if B be regarded as at rest, its motion *together with its space* towards A, are necessarily connected, in so far as the bodies with their (original) moving forces, are merely considered in motion as relative to one another. This latter can be thereby fully comprehended *à priori* [viz.] that whether the body B in respect of empirically cognisable space be resting or moved, it must be regarded as necessarily moved in respect of the body A, and [moved] in an opposite direction; since otherwise, no influence thereof on the repulsive force of both would take place, without which no mechanical action whatever of matters on one another, i.e. no communication of motion by impact is possible.

Observation 2.

The designation force of inertia (*vis inertiæ*) must thus, in spite of the eminence of its founder's name, be entirely banished from natural science,—not only because it carries with it a contradiction in expression, or because the law of inertia (lifelessness) might thereby be easily confounded with the law of reaction in every communicated motion, but principally—because thereby the mistaken conception of those, insufficiently acquainted with the mechanical laws, would be maintained and strengthened according to which the reaction of bodies, of which we are speaking under the name force of inertia, consists in the motion being thereby swallowed up, diminished or destroyed, without the mere communication of motion being effected, in that, namely, the moving body would have to apply a part of its motion to overcoming the inertia of the resting [one] (which would be pure loss), and with the remaining portion only, could set the latter in motion; but if

nothing remained, would not be ablo by its impaet to bring the lattor into motion on account of its great mass. A motion can resist nothing except opposite motion of another, but, in nowiso its rest. Horo thereforo inertia of matter, that is mere incapacity to move of itsolf, is not tho cause of a resistance. The expression force of inertia used to designatc a special and quite poculiar force, merely in order to resist without being ablo to move a body, would bo a word without any significance. The three laws of univorsal mechanics might be more suitably designated, tho law of the *subsistence*, the *inertia*, and the *reaction of matters* (*lex subsistentiæ*, *inertiæ et antagonismi*) *by all changes of the same*. That theso, in other words, tho entiro propositions of the presont scienco, exactly answer to the categories of *substance*, *causality* and *community*, in so far as these conceptions aro applied to matter, requiros no further olucidation.

General Observation on Mechanics.

Tho communication of motion only takes place by means of such moving forces, as inhero in a matter at rest (impenetrability and attraction). Tho action of a moving force on a body in ono moment is its *solicitation*, the velocity acquired by the latter through solicitation, in so far as it increases in equal proportion to tho time, is the *moment* of acceleration. (The moment of acceleration must therefore only contain an infinitely small velocity, as otherwiso tho bodies would attain through this an infinite velocity in a given time, which is impossible. The possibility of *acceleration* generally moreovor, rests, through a continuous momcnt of the same, on the law of inertia.) The solicitation of matter through expansivo forco (*e.g.*, a compressed air that bears a weight) oecurs always with a finite velocity; but the velocity impressed thereby on another body (or withdrawn from it) can only be infinitely small; for the former is only a superficial force, or, which is the samo thing, tho motion of an infinitely small quantum of matter, which must occur consequently with finite velocity in order to be equal to the motion of a body

of finite mass with infinitely small velocity (a weight). On the other hand attraction is a penetrating force, by virtue of which, a finite quantum of matter exercises moving force on a similarly finite quantum of another [matter]. The solicitation of attraction must therefore be infinitely small, because it is equal to the moment of acceleration (which must always be infinitely small), while with repulsion, where an infinitely small portion of matter is to impress a moment on a finite [portion] this is not the case. No attraction admits of being conceived with a finite velocity without the matter being obliged to *penetrate* itself by its own attractive force. For the attraction, which a finite quantity of matter exercises on [another] finite with a finite velocity, must be superior to every finite velocity, whereby matter reacts through its impenetrability, but only with an infinitely small portion of the quantity of its matter, on all points of the compression. If attraction is only a superficial force, as cohesion is conceived, the opposite of this would follow. But it is impossible, so to conceive it, if it is to be true attraction (and not mere external compression).

An absolutely hard body would be one whose parts attracted one another so strongly, that they could not be separated by any weight, nor altered in their position with regard to one another. Now, since the parts of the matter of such a body would have to attract one another with a moment of acceleration, which would be infinite as against that of gravity, but finite as to the mass thereby driven, resistance by impenetrability as expansive force, since it always occurs with an infinitely small quantity of matter, would have to take place with more than finite velocity of solicitation, that is, the matter would seek to extend itself with infinite velocity which is impossible. Thus an absolutely hard body, that is, one which would oppose *in one moment* a resistance on impact, to a body moved with finite velocity equal to the whole of its force, is impossible. Consequently, a matter exercises by its impenetrability or cohesion only an infinitely small resistance *in one moment*, to the force of a body in finite motion. Hence follows the mechanical law of continuity (*lex continui mechanica*), namely: in no body is the state of

rest or motion—and in the latter, velocity or direction—changed by impact, in one moment, but only in a certain time, through an infinite series of intermediate states whose difference from one another is smaller than the first and last. A moved body that strikes against a matter, is not brought to rest by its resistance at once, but only by continuous retardations, or that which was at rest only [set in] motion by continuous acceleration, or from one degree of velocity into another according to the same rule. In the same way, the direction of its motion in [a body] that describes an angle, is only changed by means of all possible intermediate directions, that is, by means of motion in a curved line (which law for a similar reason, can be also extended to the change of the state of a body by attraction). This *lex continui* is based on the law of the inertia of matter, while, on the other hand, the *metaphysical* law of continuity in all change (internal as well as external) must be extended universally, and hence would be based on the mere *conception of a change in general*, as quantity, and on the generation of the same (which must necessarily proceed continuously in a certain time, like time itself), and thus has no place here.

FOURTH DIVISION.

METAPHYSICAL FOUNDATIONS OF PHENOMENOLOGY.

Explanation.

Matter is the movable, in so far as it can be an object of experience as such.

Observation.

Motion, like all that can be presented through sense, is only given as phenomenon. In order that its presentation may become experience, it requires in addition, that something should be conceived through the understanding, namely, as to the way in which the presentation inheres *in the subject*, not the definition of an *object* through the same. Thus the movable, as such, is an object of experience, when a certain *object* (here a material thing) is conceived as *defined* in respect of the *predicate* of motion. But motion is change of relation in space. Hence, *firstly* there are always two correlates here, to one no less than to the other of which, change is attributed in the phenomenon, and either *the one* or the *other* can be termed moved inasmuch as it is indifferent to both, or *secondly*, of which one must, in experience be conceived as moved to the exclusion of the other, or *thirdly* of which both must necessarily be conceived through Reason as moved at the same time. In the phenomenon, which contains nothing but the relation in motion (as to its change), there are none of these determinations, but when the movable, *as such*, i.e. as to its motion, is to be conceived as determined, namely, for the sake of a possible experience, it is necessary to indicate the conditions, by which the object (matter) would have to be determined in this or that manner, by the predicate of motion. Here, the question is not of the

transformation of illusion into truth, but of phenomenon into experience. For with illusion the understanding is always engaged with its own judgment determining an object—although it is in danger of mistaking the subjective for objective—but in the phenomenon no judgment of the understanding is to be met with; and this is necessary to be remembered, not only here, but in the whole of philosophy, because, otherwise, when we are concerned with phenomena, and this expression is taken as identical in signification with that of illusion, misunderstanding will always arise.

PROPOSITION 1.

The rectilinear motion of a matter is, in respect of an empirical space, as distinguished from the opposite motion of the space, a merely *possible* predicate. The same [thing] conceived in no relation to a matter outside it, that is, as *absolute motion*, is *impossible*.

DEMONSTRATION.

Whether [in the case of] a body moved in relative space, this latter be described as resting, or conversely, as moved with equal velocity in an opposite direction, and the former as resting, there is no statement as to what belongs to the object, but only to its relation to the subject, in other words, to the phenomenon and not to experience. For if the spectator place himself in the same space as resting, he terms the body moved; but if he place himself (at least in thought) in another space enclosing this, in respect of which the body is, in the same way, resting, then the relative space is termed "moved." In experience, therefore (a cognition, determining validly the object for all phenomena), there is no difference whatever between the motion of the body in relative space, or the rest of the body in absolute, and the equal and opposite motion of the relative, space. Now the presentation of an object by one of its two predicates—which, in respect of the object, are equivalent, and only as regards the subject and its mode of presentation distinguished from one another—is not its determination according to a *disjunctive*, but merely an *alternative judgment* according to choice (of which

the first of two *objectively* opposed predicates, one with the exclusion of its contrary, but the other of objectively equivalent indeed, but subjectively opposed judgments without excluding the contrary of the object, in other words, by mere choice)—one is assumed for the determination of the same [viz., the object].* This means: by the conception of motion as object of experience, it is in itself undetermined, and therefore equivalent, whether a body is conceived as moved in relative space or the space in respect of the body. Now that which, in respect of two mutually opposed predicates, is in itself undetermined, is so far *merely possible*. Hence the rectilinear motion of a matter in empirical space, as distinguished from the equal opposite motion of the space, is in experience a merely possible predicate, which was the first [point].

Further, since a relation, in other words a change of the same, namely, motion, can only be an object of experience in so far as both correlates are objects of experience—but pure space, also called, in contradistinction to the relative (empirical), absolute space, is no object of experience and nothing at all—therefore rectilinear motion, without reference to anything empirical—that is, absolute motion —is simply impossible;—which was the second [point.]

Observation.

This proposition determines the modality of the motion in respect of *Phoronomy*.

PROPOSITION 2.

The circular motion of a matter as distinguished from the opposite motion of the space, is a *real* predicate of the same; while, on the other hand, if the opposite motion of a relative space be taken, instead of the motion of the body, there is no real motion of the latter, but [should it be regarded as such] a mere illusion.

Demonstration.

The circular motion is (like every non-rectilinear

* Of this distinction of disjunctive and alternative opposition, more in the general observation to this division.

[motion]) a continuous change of the rectilinear, and as this is itself a continuous change of relation in respect of external space, the circular motion is a change of the change of these external relations in space, and consequently a continuous arising of new motions; since, now, according to the law of inertia, a motion, in so far as it arises, must have an external cause, while tho body, in every point of this circle, is endeavouring, according to the same law, to proceed in the straight line touching the circle, which motion works against the above external cause, every body in circular motion demonstrates by its motion a moving force. Now the motion of the space as distinguished from that of tho body is merely *phoronomic*, and has no moving force. As a consequence, the judgment, that here, either the body or the space is moved in an opposite direction, is a *disjunctive* judgment, by which, if the one member, tho motion of the body, be posited, the other, namely, that of the space, is excluded. Hence the circular motion of tho body, as distinguished from the motion of the space, is a *real* motion, and consequently the latter, even though as phenomenon it coincide with the former, nevertheless, in the complex of all phenomena, that is, of possible experience, contradicts it, and hence is nothing but mere illusion.

Observation.

This proposition determines the modality of motion in respect of *Dynamics;* for a motion, which cannot take place without the influence of a continuously active external moving force, proves indirectly or directly original moving forces of matter, either of attraction or repulsion. For the rest, Newton's scholium to the definitions with which he introduces his *Princ. Philos. Nat. Math.*, towards the end, may be referred to, on the present subject, from which it will appear, that the circular motion of two bodies round a common centre (hence, also the motion of the earth on its axis), even in empty space, and thus without any comparison being possible through experience, *with external space*, may nevertheless be cognised by means of experience, in short, that a motion which is a change of external relation in space

can be given empirically, although this space itself is not empirically given, and is no object of experience—a paradox deserving to be solved.

Proposition 3.

In every motion of a body, whereby it is moving in respect of another, an opposite and equal motion of the latter is *necessary*.

Demonstration.

According to the third law of mechanics (Proposition 4) the communication of the motion of a body is only possible through the community of its original moving forces, and these only through reciprocal and equal motion. The motion of both is then real. But as the reality of this motion does not rest (as in the second proposition) on the influence of external forces, but follows immediately and inevitably from the conception of the relation of the *moved* in space, to every other [thing] thereby *movable*, the motion of the latter is *necessary*.

Observation.

This proposition determines the modality of motion in respect of mechanics; that, for the rest, these three propositions determine the motion of matter in respect of its *possibility*, *reality*, and *necessity*, in short, in respect of all the three categories of MODALITY, is sufficiently obvious of itself.

General Observation on Phenomenology.

There are thus three conceptions noticeable here, whose employment in universal natural science is unavoidable, and whose exact definition is for this reason necessary, although not so easy and comprehensible: firstly, the conception of *motion in relative* (movable) *space;* secondly, the conception of *motion in absolute* (immovable) *space;* thirdly, the conception of *relative motion* generally, as distinguished from absolute [motion.] The conception of

absolute space is laid at the foundation of all [these]. But how do we come by this singular conception, and on what rests the necessity of its employment?

It can be no object of experience; for space without matter is no object of perception, and yet is a necessary conception of the Reason, and therefore nothing but a a mere *idea*. For in order that motion may be given even as phenomenon, an empirical presentation of space in respect of which the movable has to change its relation is required. But space, which is to be perceived, must be material, and therefore in accordance with the conception of a matter generally, itself movable. Now, in order to conceive it as moved, one has only to conceive it as contained in a space of greater compass, and to assume the latter as resting. But this admits of being treated similarly as regards a still more extended space, and so on to infinity, without ever attaining through experience to an immovable (immaterial) space, in respect of which any matter could have absolute motion or rest attributed to it; but the conception of these relational determinations will have to be constantly changed, according as the movable is considered as in relation to one or the other of these spaces. Now, as the condition of regarding anything as resting or moved is always again and again conditioned to infinity in relative space, it thence appears: *firstly*, that all motion or rest is merely relative, and that neither can be absolute, i.e., that matter can merely be conceived in relation to matter as moved or resting, but not in respect of mere space without matter; in other words, that absolute motion, such, namely, as is conceived without any reference of one matter to another, is simply impossible: *secondly*, [it will appear] that for this very reason no conception of motion or rest, in relative space, valid *for every phenomenon*, is possible, but that a space must be conceived, in which the latter itself can be thought of as moved, but whose determination does not depend on any other empirical space, and hence is not again conditioned, that is, an absolute space to which all relative motions may be referred, and in which everything empirical is movable; [and this] in order that all motions of the material in the same can be valid as merely relative to one another, as alternatively-

reciprocal,* but none as absolute motion or rest (since, inasmuch as one is called moved, the other, with reference to which our former is moved, may be similarly conceived as absolutely resting). Absolute space is then necessary, not as a conception of a real object, but as a mere idea which is to serve as a rule, for considering all motion therein as merely relative, and all motion and rest must be reduced to absolute space if the phenomenon of the same is to be transformed into a definite conception of experience (which combines all phenomena).

In this way the rectilinear motion of a body in relative space, is reduced to absolute space, which does not fall within the range of the senses if I conceive the body, as at rest in itself, and this presentation as that which gives precisely the same phenomenon, whereby all possible phenomena of rectilinear motions, which a body may happen at the same time, to possess, are reduced to the conception of experience, which unites them together (namely, to that of merely relative motion and rest).

Circular motion, inasmuch as, according to the second proposition, even without reference to the external empirically given space, it can be given as real motion in experience, seems to be really absolute motion. For the relative in

* In logic the *either or* always denotes a *disjunctive* judgment; for if one be true, the other must be false. For instance, a body is either moved or not-moved, that is, at rest. For it is simply the relation of the cognition to the object which is there spoken of. In phenomenal doctrine, where the relation to the subject is referred to, in order therefrom to determine the relation to the object, it is otherwise. For there the proposition: the body is either moved and the space at rest, or conversely, is not a disjunctive proposition in an objective, but only a subjective connection, and both these judgments therein contained are *alternatively* valid. In the same phenomenology, where the motion is considered not merely phoronomically, but rather dynamically, on the contrary, the disjunctive proposition is to be taken in an objective signification, that is, in place of the turning of a body I cannot assume its rest and the opposite motion of the space. But even where the motion is regarded *mechanically* (as when a body rushes against another apparently resting) even then, the, as regards form, disjunctive judgment in respect of the object is to be employed *distributively*, so that the motion must not be attributed *either* to the one *or* to the other, but to each an equal share. This distinction of *alternative*, *disjunctive* and *distributive* determinations of a conception as regards mutually opposed predicates has its importance, but cannot be further discussed here.

respect of external space (for instance, the motion of the earth on its axis, relative to the heavenly bodies), is a *phenomenon*, in place of which, the opposite motion of this space (the heavens), in the same time, can be posited as fully equivalent to the former, but which, according to this proposition, can never in experience be put in the place of the former; and therefore the above circular motion cannot be regarded as externally relative, which sounds as though this kind of motion were assumed as absolute.

But it is to be observed that the question is here of the true (real) *motion*, which does not *appear* as such—which therefore, were we content to judge according to empirical relations of the space, might be regarded as *rest*—in other words, the question is of the *true motion* as distinguished from the illusive, but not of it as absolute motion in contradistinction to the relative; and hence circular motion, although it exhibits in the phenomenon, no change of place, that is, no phoronomic [change] of the relation of the moved to empirical space, exhibits, nevertheless, a continuous dynamic change of the relation of matter *in its space*, demonstrable by experience; for instance, it shows a constant diminution of the attraction by an effort to retreat, as the effect of circular motion, and thereby decisively indicates its distinction from illusion. For instance, one can conceive the earth as turned about its axis in infinite empty space, and demonstrate this motion by experience, although neither the relation of the parts of the earth among one another, or to the space outside it, is changed phoronomically, i.e., in the phenomenon. For, as regards the first, nothing changes its place upon or in the earth as empirical space; and with reference to the second, which is quite empty, no externally changed relation, and therefore no phenomenon of a motion can take place. But if I suppose a deep cavern tending towards the centre of the earth, and dropping a stone into it, find that although at every distance from the centre, the gravity is always directed thereto, the falling stone nevertheless, continuously reverts from its upright position, from west to east, I conclude that the earth is from evening to morning turned about its axis. Or, if I withdraw the stone from the surface of the earth, and it does not remain over the

same point of the surface, but moves itself from east to west, I shall still infer the foregoing motion of the earth on its axis, and both perceptions are a sufficient proof of the reality of this motion, for which the change of relation to external space (the starry heaven) is inadequate as it is mere phenomenon, which may proceed from two actually opposed causes, and which is not a cognition deducible from the ground of explanation of all phenomena of this change, that is, experience. But that this motion, although no change of relation to empirical space, is nevertheless no absolute motion, but continuous change of the relation of matters to one another, and while conceived in absolute space, is really only relative and for this very reason, alone true motion; this rests on the conception of the reciprocally continuous *retreat* of each part of the earth (outside the axis) from every other [part], situated opposite to it in the diameter, at equal distance from the centre. For this motion is real in absolute space, in that thereby the retreat from the distance in question, when gravity in itself would attract to the body, and indeed without any dynamical repulsive cause (as may be seen from the instances chosen in Newton's *Princ. Phil. Nat.*, p. 10, Edit. 1711),* is continuously replaced by real motion inclosed within the moved matter (namely, the centre of the same), but not having reference to the external space.

As to the case of the *third proposition*, it does not require, in order to show the truth of the reciprocally opposed and equal motion of two bodies even without reference to the empirical space, [to exhibit] the active dynamical influence (of gravity or of a distended string) given through experience, which is necessary in the second case, but the mere dynamical possibility of such an influence as pro-

* He there says: *Motus quidem veros corporum singulorum cognoscere et ab apparentibus actu discriminare difficillimum est; propterea quod partis spatii illius immobilis, in quo corpora vere moventur, non incurrunt in sensus. Causa tamen non est prorsa disparata.* Thereupon he allows two spheres attached by a thread, to turn about their common centre of gravity in empty space, and shows how the reality of their motion, together with its direction, can nevertheless be found in experience. I have also sought to demonstrate this under somewhat altered circumstances from the earth as moved on its axis.

perty of matter (repulsion or attraction) since the motion of the one carries with it, at the same time, the opposite and equal motion of the other, and indeed from mere conceptions of a relative motion, if it be considered in absolute space, i.e. according to truth; and it is, therefore, like all that is adequately demonstrable from mere conceptions a law of absolutely necessary counter-motion.

There is no absolute motion, even where a body is conceived as moved in respect of another in empty space; the motion of both being here, not relative to the space surrounding them, but only to that between them, which alone determines their external relation to each other, considered as abstract space, and is thus in its turn, only relative. Hence, absolute motion would be only that accruing to a body without relation to any other matter. But such would be the rectilinear motion of the *universe*, i.e. the system of all matter. For so long as any other matter existed outside of a matter, even though separated by empty space, the motion would still be relative. For this reason every proof of a law of motion, having as its result, that its contrary would necessarily imply a rectilinear motion of the whole universe as its consequence, is an apodictic demonstration of its truth; simply because absolute motion would thence ensue, which is quite impossible. Of this kind is the law of *antagonism* in all community of matter through motion. For every deviation from the same would move the common centre of gravity of all matters, in short, the whole universe, from its place, while on the contrary this would not happen if one regarded the latter as turned on its axis, a motion always possible to be conceived, although so far as one can see, there would be no use in assuming it.

The different conceptions of *empty space* also have their reference to the different conceptions of motion and moving forces. Empty space in a *phoronomic* sense, also termed absolute space, ought not properly to be called empty space; for it is only the idea of a space, in which I abstract from all particular matter, making it an object of experience, in order to conceive therein, the material, or every empirical space, as movable, and the motion not merely as on one side absolute, but as

mutually relative predicate. Hence it is nothing belonging to the existence of things, but merely to the determination of the conception, and in so far no empty space *exists*. Empty space, in a *dynamic* sense, is that which is not filled, i.e., in which nothing else movable resists the penetration of the movable, consequently in which no repulsive force acts, and it may be either the empty space within the world (*vacuum mundanum*), or, if the latter be conceived as bounded, empty space *outside* the world (*vacuum extramundanum*); the first moreover, either as distributed (*vacuum disseminatum*), which constitutes only one portion of the volume of the matter, or as continuous empty space (*vacuum coacervatum*, which separates bodies, for instance, the heavenly bodies, from one another), a distinction which, inasmuch as it rests on the difference of places, assigned to empty space in the universe, is not essential, but is used in various ways; firstly, in order to deduce the specific difference of density, and secondly, in order [to deduce] the possibility of a movement in the universe, free from all external resistance. That empty space *in the first sense* is not *necessary* to be assumed, has already been shown in the general remark on dynamics; but that it is *impossible* can by no means be demonstrated from its conception alone, according to the principle of contradiction. Yet, even if no merely logical ground for its rejection be present, a universal physical ground for banishing it from natural science exists, namely, that of the possibility of the composition of a matter generally, if the latter [question] were only better understood. For if *attraction*, which is assumed for the explanation of the cohesion of matter, be only apparent, not real, attraction—but as it were the effect of a *compression*, by external matter (the ether) existing throughout the universe, which is itself brought to this pressure, by a universal and original attraction, namely, gravitation, an opinion supported by many reasons—empty space within matters would then, although not logically, be nevertheless dynamically, and hence physically, impossible, since every matter would expand of itself, in the empty spaces assumed within the same (as nothing would then resist its expansive force), and they

would thus be always filled. An empty space *outside the world*, would, if by this expression be understood all the principal attractive matters (the large heavenly bodies), be impossible, for the same reason, for in proportion as the distance from these increased, the attractive force on the ether (which encloses all the above bodies, and impelled by them maintains in their density by compression), would diminish in inverse proportion, and the latter itself, would diminish in density to infinity, though it would nowhere leave the space entirely empty. Meanwhile, it need surprise no one that in this rejection of empty space, we are proceeding quite hypothetically; for its assumption fares no better. Those who venture to decide this moot question dogmatically, whether they do so affirmatively or negatively, support themselves in the end on mere metaphysical assumptions, as may be seen from the dynamics; but it was at least necessary to show here, that this could not decide in the problem in question. Thirdly, as concerns empty space in a *mechanical* sense, this is continuous emptiness within the universe, in order to procure free motion for the heavenly bodies. It is easily seen, that the possibility or impossibility of this rests, not on metaphysical grounds, but on the hardly disclosed secrets of nature, as to the way in which matter sets limits to its own expansive force. Notwithstanding this, if that be admitted which has been said in the general observation on dynamics, as to the possibly greater expansion to infinity of specifically different matters, with the same quantity of matter (as regards its weight) an empty space might indeed be then unnecessary to assume, even for the sake of the free and lasting motion of the heavenly bodies, as the resistance, even in entirely filled spaces, might then be assumed to be as small as one liked.

And so ends the metaphysical doctrine of body with *emptiness* and therefore incomprehensibility, and the reason has the same fortune in all other attempts, where it strives to reach principles of the ultimate grounds of

things, inasmuch as its nature is such, that it can never comprehend anything except in so far as it is determined under given conditions; consequently, since it can neither rest at the conditioned nor can make the unconditioned comprehensible, when thirst for knowledge stimulates it, to grasp the absolute totality of all conditions, nothing remains for it but to turn back from objects, upon itself, in order that instead of the ultimate boundaries of things, it may investigate and determine the ultimate boundaries of the capacity pertaining to itself.

INDEX.

A

Abbé Siéyès, lxvii.
Absolute, as *ens realissimum*, lxxxiii., –viii., –ix.; Schelling's, xcvi.; illusionism, xcvii.; von Hartmann's, xcviii.
Abstract notions, lxxx.
Accident, 145.
Action, 3; at a distance, 186; and reaction of forces, 196; reciprocal, and reaction, 223; mechanical and dynamical, law of, 227.
Adamson, Prof., on Kant's position as a thinker, xcv.
Æsthetic education of man, xliv.; data of, lxxvii.; transcendental, lxxx., –iii., xcvii., 66.
Allgemeine literarische Zeitung, xxxix.
Altpreussische Monatshefte, vii.
Analysis, 208.
Analytic, transcendental, lxxx., xcvii.
Anatomisation, ci.
Andersch, xx.
Anfangsgründe, pref. v., vii.
Anglo-American war, xxiv.
Anthropology, lii., –iii., –viii.
Anthropomorphism, 106.
Antinomies, lxxxv., 79.
Apodictic, lxxxviii.; certainty, 14, 27.
Apperception, unity of, xciii. *note*, vi., 221.
A priori, 129, 130.
Arensdorf, xx.
Aristotle, liii., lxxii.
Association, law of, 4.
Atom, lxxiv., xcv., cii., 210.
Attraction, 189.
Auerswald, xxxvii.
Aufklärung, xiii., xxx., lxxi.

B

Bacon, lxxv.
Bahnsen, xcvii.
Basedow, lxxvi.
Baumeister, xxi.
Baumgarten, xxi., lxxxiii., –v., 16, 73.
Beattie, lxxiv., 4, 5.
Beck, xli.
Beginsels der Kantiaansche Wijsgeerte, xlii.
Behm, xix.
Beiträge zur Mechanik des Himmels, civ.
Beneke, xcvii., xcix.
Berkeley, vi., lxxiii., –v., lxxxiii., 40, 124; his view of space, 125.
Berlin, xx., –vii., –ix., l., li.
Berliner Monatschrift und Berliner Blätter, xlvi., li.
Body, doctrine of, 137.
Bohn's Philosophical Library, pref. iii.
Borowski, pref. vii., xlviii.
Britain, ciii.
British School, lxxiv.
Buck, Dr., xxii., –ix.
Buckle, cvi.
Bürger, lxv.
Butler, lxvi

C

Calvinistic churches, xlix.
Cant, Johann Georg, xiii.; Frau Cant, Joh. Heinr., Reg. Dorothea, Maria Elisabeth, and Cath. Barbara, xiv.
Carlyle, ci.
Cartesian dualism, lxxiv.
Categorical Imperative, lxix.
Categories, lxxxi., -ii., -iii., -v. xci., -iii., -vi.; deduction of, xciii.; dynamic, lxxxii., 70, 71; origin of, 78; table of, 144.
Causality, lxxv., 230.
Cause, 3, 4, 59, 81; and effect, 3, 6.
Chemistry, not a science, 139–141.
Cleanthes, 107.
Clifford, Prof., and the mind-stuff theory, quoted, xciii., xcix.
Code d'honneur, xxv.
Cognition, lxxix.; genetic origin of, lxxxi., -ii., 4.
Common sense, 5.
Community, 230.
Composite, of things in themselves, and in the phenomenon, 182.
Comte, lxiii., c., cvi.
Conceptions, 139; construction of, 139; pure, of the understanding, 145, 221.
Conditions, of thought, lxxxi.
Conflict of the Good Principle with the Evil, Kant's essay prohibited, l.
Congruity, 165, -7.
Consciousness, lxxv.; conditions of, lxxvii.; in general, lxxv., -ix.; individual, lxxx.; unity of, lxxxi., -vi., xc.; foundation of, xcii.; possibility of, xcvi.; content of, xcvii.; individuation of, xcviii.; 221.
Contact, 186.
Content, 12, 20.
Continuity, mechanical law of, 231; metaphysical law of, 232.
Controversies, lxxx.
Cosmology, lxxv.
Creator, xv.
Criticism, lxxviii., -ix., lxxx.
Critique, of Pure Reason, xxi., -v., xxx., -iii., -iv., -ix., xlii., -iii., liv., lxviii., lxxiv., -viii., lxxxvii., 7, 21; of Practical Reason, xxxviii., xlii.-iv.; of the power of Judgment, xxxviii., xliii.
Crusius, xxiii., xxxi., 66.
Crux Metaphysicorum, 59.

D

Darwin, Erasmus, cv.; Charles, civ. -v.
Darwinism, civ.
Degree, 221.
De igne, Kant's Examination theme, xxi.
Deism, 105.
Demokritos, 211.
De Mundo sensibili, xxix.
De Monadologica physica, xxii.
Denken, iv.
Descartes, lxxii., - v., cviii., 40, 211.
Deutsche Mercur, xxxv.
Dialectic, transcendental, lxxv., lxxx., xcvi.
'Dialogues concerning Natural Religion,' xxxiii.
Differentiation, of subject and object, xciii.
Ding-an-sich, lxxxii., -iii.
Direction, unity, plurality, and totality of, 168.
Distributive unity, lxxxvi.
Dogmatism, lxxvi., -ix., lxxxii., -v.
Dove, civ.
Dualism, xciii., -vii., -ix
Dübring, quoted, xcix.
Dynamics, 147, 169, 236.

E

Effect, 3, 6.
Ego, xc., -ii., -iii. *note*, 221.
Egoition, xc., -iii. *note*.
Elasticity, 172, 193, 207.
Eleatic School, 124.
Emile, Rousseau's, xxiii.
Empiricism, lxxvi., -ix., lxxx., -ix.; empirical service, 137.

Emptiness, 244.
England, xli.
English School, lxxxi.
Ens realissimum, lxxxiii., –vi., –viii., xciii.
Entities, thinking, 35; corporeal, 155.
Erasmus, lxvi.
Erhard, xlii., –iii.
Erkenntnisstheorie, lxxvii., lxxxviii.
Erlangen, xxviii.
Ethics, metaphysics of, xlvii., lii.; criterion of, lxxvii.
Euclid, 17.
Euler, 195.
"Everlasting Peace," xli.
Evolution, Kant and the theory of, lxx.; doctrine of, xcvi., ci., –iii., –iv.
Experience, lxxix., lxxxii.; productive synthesis of, lxxxi.; conscious, xcii.; productive, re-reading of, and transcending of, cii.; objects of, 44; judgments of, 45.
Extension, 172.

F

Faculty of philosophy and science, cvi.
Fatalism, 113.
'Faust,' lxvi.
Feeling, xc.
Feudalism, lxvii.; feudal lords, xx.
Fichte, xlii., –iv., –v., –vi., –vii., xcv., –vi., ci.
First Principles, Mr. H. Spencer's, pref. vii., cvii.
Fluid, 203.
Force, persistence of, ci.; attractive, repulsive, driving and drawing, 171; compressive, 173; superficial and penetrative, 191.
Forms, subjective, lxxxiii.; form, 151.
Formulæ, psychological, xcii.
'Foundation to a Metaphysic of Ethics,' xliv.
France, xli., lxvii., lxxvi., cii.
Frederick the Great, xvi., xxii., xxx.; II., xxxiii.
Freedom, noumenal, lxix., lxxxix., 147.
French Revolution, xlvii., lxvii.
Friction, 203.
Friedrich Wilhelm I., xi.; III., xx.; II., liii.

G

Garve, liii.
Gelehrten, xx.
Gelehrte Zeitung, xxviii.
'General Natural History and Theory of the Heavens,' xxii.
Geometry, 15, 30; pure, 33, 149; geometrician, 180.
Germany, xl.–ii., lxxiv., cvii., 132; Germans, 132, 181.
'Geschichte der Philosophie,' lxxxvii., lxxxix.
Gibbon, xvi., cviii.
God, lxxxix., 147.
Goethe, 'Dichtung und Wahrheit,' xii., xliii., lxv., –vi., cviii.
Gotha, civ.
Gottäische gelehrte Zeitung, 130.
Göttingen Gelehrten Anzeigen, 123.
"Grace and Dignity," xliv.
Gräfe and Munzer, xxviii.
Gravitation, 193.
Green, xxiv.–v.

H

Häckel, xcix.
Halle, xli.
Haller, lxv.
Hamann, Johann Georg, xxiii.–iv., xxxiii., –iv., xxxv.
Hansen, civ.
Hartknoch, xxxiv., –v.
Hartmann, Eduard von, xciv., –vii., –viii.
Hartung, xlvii.
Hay, xxvi.
Hegel, xlvii., xcvi., cviii.
Heidelberg, xxxix.

'Héloïse,' Rousseau's, xxiii.
Herbart, xcvii., –viii., –ix.
Herbert, Maria von, xlvii., –ix.
Herder, xxii., –iii., xxxiii.; his 'Ideas,' etc., xxxv., –ix.
Herschel, eiv.
Herz, M., xxxiii.
Hobbes, lxxxv.
Homogeneity, qualitative, xcii.
Hufeland, 'Art of prolonging human life,' xlv., lii.
Hulsen, von, xx.
Hume, xxiiii., xxxiii., –iv., lxvi., lxxiii., –iv., –vi., 3, 4, 5, 6, 7, 8, 16, 18, 24, 57, 59, 60; his Dialogues, 100, 105, 107, 109.
Hutcheson, lxvi.
Hydrostatics, fundamental law of, 206.
Hylozoism, 223.
Hypostasis, xe.

I.

Idea, lxxxv., –ix.; of universal History from the point of view of Humanity, evi.; psychological, 81; cosmological, 86; theological, 96.
Idealism, lxxvi., xevii., 35, 36.
'Ideas of the Reason,' lxxxii., 76; origin of, 78.
Ideality, subjective, pref. vi.
'Ideen zur Geschichte der Menschheit,' xxiii.
Illusionism, lxxxv., xe.; absolute, xcvii., 39.
Immortality, 147.
Impenetrability, 186.
Impression, lxxv.
Inbegriff, 78.
Incognisability, lxxxviii.
Incomprehensibility, 244.
Individuation, xciii., –viii.
Inertia, law of, 222; force of, 228.
"I-ness," xc.; I, 221.
"In-ness," xciii.
Institut nationale, xlii.; critical, dogmatic and sceptical, 126; dreaming, visionary, critical, 40; Cartesian, 85; Kant's, 124–5.
Intelligence, conscious, lxxxvii.
'Intelligoneer,' xxxviii.
Internal sense, lxxxii., xe.
Intersusception, 208.
Intuition, 27, 28; sensuous, 33.

J

Jaehmann, xxiv., xxvii., xxxi., lxx., pref. vii.
Jacobi, xxxv.
Jäsche, liii.
Jena, xxix., xxxix.
Judgments, distinction between analytic and synthetic, 12, 22; principle of analytic, 13; empirical, 14; mathematical, 14; apodictic, 15: metaphysical, 19; disjunctive and alternative, 234, 236, 238.
Judicia plurativa, 49.
Jupiter, xxxix., 191.

K

Kant, childhood, xi.–xv.; and 18th century thought, xvi.; maiden-essay, xix.; father's death, xx.; becomes Ph. D., xxi.; is Privat Docent, xxii.; Green and Motherby, xxv.; accepts librarianship and curatorship, xxviii.; his picture, xxviii.; dean of the university, xxxii.; letters to Schiller, xlv.; his "protector," xlix.; and Christianity, li.; and the birds, lvii.; "table-companions," liv.; death, lx.; interment and will, lxii.; and matrimony, lxiv.; and his relatives, lxiv.
Kanter, xxviii.
Kaufmann, lvi., –viii., lxii.
Kayserling, Count of Rautenburg, xx.
Kepler, xxiii.; and the vis inertiæ, 228.
Kirchmann, civ., pref. vii.

Knowledge, origin of, lxxii.; theory of, lxxii., lxxix., lxxxii., xcix., ci., cii.; synthetic and analytic, 22.
Knutzen, xix., xxii.
Königsberg, xi., xiii., xvii., xx., xxi., –vii,, –viii., –ix., xxx., –v.
Korff, Nikolaus von, xxii.
Kraus, Prof., xxxv., –vi., –vii.
Kritik der Urteilskraft, civ.
'Kritische Magazin,' xlii.

L

Lambert, 170.
Lampe, lv., lvi., lxii.
Lange, xcix.
Latin classics, xviii.
Law, reign of, cvii.
Leibnitz, xii., lxxiii., xcii., –viii., 3, 182.
Lessing, lxv.
Letters on the Improvement of Humanity, xxiii.
Letters to Mendelssohn on the Doctrines of Spinoza, xxxv.
Lex subsistentiæ, inertiæ et antagonismi, 230; continui mechanica, 231–2.
Limitation, 199.
Lisbon, xxii.
Locke, lxvi., lxxii., –iii., –iv., xcvi., 3, 16, 36.
Logic, 59; transcendental, 66.
Logical Table of the Judgments, 50.
London, xl.
Lotze, xcvii., xcix.
Lutheran churches, xlix.

M

Machine, 210.
Mahaffy, Prof., pref. iii.
Marat, J. P., lxvii.
Mariotte, 198.
Materialism, lxxvi., xciii., –vii., 113.
Mathematics, higher, cii.; pure, 14, 26; how possible, 27; definition, 139; applied, 141.
Mathesis intensorum, 54; as quantity of motions. 160.
Matter, lxxiv., xcii., –vii., 150–1; impenetrability of, 174–5, 215.
Maxims, lxxxix.
Mayer, civ.
Mechanics, 147; metaphysical foundations of, 214; first law of, 220; second law of, 222, 226; three laws of, 230; third law, 237.
Medium, elastic, 209.
Meier, Prof.. xxx.
Mendelssohn, xxxv., –vi., xliv.: Moses, 8.
Metaphysics, liv.; dogmatic, lxxxv., cii., 1, 10; definition, 12, 17: whether possible, 26; as a science, 122, 139.
Metaphysische Anfangsgründe der Naturwissenschaft, pref. vi.
Method of psychology, xciii.; dialectical, xcvi.; progressive and regressive, 23; analytic, 25.
Metz, xlii.
Milton, xlv.
Mind, lxxvi., xcii.; mind-stuff, xciv., –ix.; mind and body, xciv., –vii., –ix.; individual, vi.
Mitau, xiv.
Modality, 146. 237.
Mohrungen, xx.
Molecule, xcv.
Momenta, pref. vi.
Monads and monadology, lxxiv., lxxxiv., xcii., xcv., –viii., 177–8, 182.
Monarchy, lxvii.
Monism, lxxxv., –ix., xci., –iii., –v., –vii., –ix., ci.
Montaigne, lxvi.
Motherby, xxxvi., lvi.
Motion, 150–2, 159; composition of, and rectilineary, 160; compound, 167; mechanical, and chemical, 207; transfusion of, 228, 239; circular, 235, 237, 239.

N

Nature, xv., 4, 18, 34, 41, 42; formal in, 43, 66; dynamic laws of, 54; how possible, 65; universal laws of, 67, 137, 138; historical doctrine of, 138, 200, 210.
Naturalism, 113.
Nebular theory, ciii.
Necessity, 14, 138.
Negation, lxxxvi., 199.
Negativity, xcvii.
Neo-Kantian literature, ciii.
Newton, xix., xxiii., cvi., 148, 190, 198, 205, 227, 236, 241.
Nicolovius, xxxv., li.
Nitsch, xl.
Niveau, lxxv.
Nominalist, lxxx.
Noumenon, lxxxii., -iii., -iv.; as infinite plurality and as infinite unity, lxxxv., -vii.; three aspects of, lxxxviii.-ix.; noumenal fact, xcvi., -vii., -viii., 60, 62, 63, 64, 81; immanent, pref. vi.
Novus ordo rerum, xxxix.
Number, lxxxiv.

O

Objectivation, lxxxvi.
Objectivity, lxxix., lxxxii.; unconditional object, lxxxii., -iii.; empirical object, lxxxiv.
Obscurantists, liii., cvii.
Ontology, lxxv., lxxxii., xciv.
Opus maximum, liv.
Order in Council, li.
Organism, xcv.
Organon, lxxvii.
Oswald, 4.

P

Paralogisms, xci., 79, 132.
Particularia, 49.
Particulars, lxxx.
Paul, J., xliv.
Paulus, cvii.
Pedagogic, liii., lxxi.
Perception, lxxxi., -ii., -iii.; judgments of, 45, 99.
Permanence, law of, 141.
Personification, lxxxvi.
Pessimism, xcviii.
Pfarrerthum, xvii.
Phenomena, lxxxii., -iii., 62, 239; external and internal order, xcii., -iii.,-vii.; phenomenalism, lxxxv.; phenomenalisation, xci.; phenomenology, 147, 233.
Philosophie des Unbewussten, xcviii.; philosophia definitiva, 20.
Philosophische Monatshefte, pref. iv.
Phoronomy, 147, 150, 153, 158, 167, 225, 235.
Physical Geography, liii.
Physics, liv.
Pièces d'occasion, xxvii., xli.
Pietism, xiii.
Pitt, lxvi.
Plan de Constitution, lxvii.
Plato, lxxii., 125.
Plattner, 98.
Pluralism, xcviii.
Pomerania, xii.
Pope, lxvi.
Possibilities, lxxxviii.
Post-Kantian philosophies, xcv.
Postulate, material, xcx.; monistic, xcviii.; ultimate, cii.
Predicables, 72.
Predicate, lxxxvi.
Presentation, lxxv., lxxxiii., xcviii., 58; empirical, pref. iv., 142.
Priestley, 4.
Primarias, 36.
Principles, lxxxix., 138.
Principiorum primorum cognitionis metaphysicæ, xxi.
Privat docent, xxi.
Process, timeless, transcendental, xcv., -vi.
Prolegomena, xxxiv., -v., xli., lxxviii., 17, 10, 21, 131.
Propædeutic, lxxviii., 42.

'Proposals etc. according to the principles of Prof. Kant,' xl.
Providence, xv.
Prussia, xxvii.
Psychology, lxxv., –vii., ci.; empirical, 141.
Pure Physiological Table of the Universal Principles of Natural Science, 50.
Pure Reason, lxxx.

Q

Quality, 145; qualitas occulta, 175.
Qualities, space and time as, 32.
Quantitas qualitatis est gradus, 56.
Quantitative categorical unity, xc.
Quantity, 145, 158.
Quantum continuum, 197.
Quasi-consciousness, xcv.
Quixote, Don, lxvi.

R

"Radical Evil," l.
Reality, prius of, xcvi.; objective, pref. vi., 199.
Reason, 2, 3, 5, 13, 17, lxxix., lxxx., –i., –v., –vii., –ix.; antinomy of, 39, 124; speculative, etc., 131, 133, 212, 233, 237.
Rechtslehre, lxvii.
Reformation period, xiii.
Regulative, lxxxii.
Reicke, pref. viii.
Reid, 4.
Reimarus, lxxvi.
Reinhold, xxxv., xliv.
Relation, 145.
'Religion within the Boundaries of mere Reason,' li., –ii.
Reproduction, lxxxi.
Republicanism, lxvii.
Rest, 159.
Reuter, Anna Regina, xiii.
Revelation, xli.
Richardson, John, xli.; his translation, pref. iii., 33 *note*.
Richter, xxi., xliii.
Rink, Prof., liii.
Rotterdam, lxvi.
Rousseau, xxiii., lxvi., –vii
Russians, xxii.
Russmann, xxvi.

S

Saturn, 191.
Savants, philosophic, xciii., –ix.
Scepticism, lxxxii., 8.
Schelling, xlvii.
Schema, 63.
Schiller, xxxix., xliii., –iv., lxvi.
Schlossgarten, lvi.
Scholasticism, xlvii.
Schopenhauer, lxiii., –viii., lxxxi., xciv., –vii., –viii., cviii.
Schubert, pref. viii.
Schultz, xlv.
Science, pure natural, 26, 134; rational, etc., 138; natural, 200.
Segner, 15.
Self-consciousness, xci.; formal, xcv.
Sense, outer, lxxxiv.
Sensibility, lxxx., –iii.
Sensuous intuition, lxxxi.
Silesia, xii.
Solidity, 170.
Solution, 207; absolute, 208.
Somnio objective sumto, 126.
Soul, or thinking self, 83; doctrine of, 137, 141.
Space, lxxx., –ii., –iii., –iv., xciii., –viii., 29, 150–1; filling of, 175, 202; relative, 225, 237; empty, 243; mechanical sense of, 230, 244; quantity of in the movable, 218; persistence of, 129, 145, 176.
Spencer, Herbert, lxxx., cvii., pref. vii.
Spinoza, xxxv., lxxiii., –v., lxxxv., xcix., ci.
Spiritualism, xciii.
Stagirite, lxxii.
Stallo's Concepts of Modern Physics, pref. vii.
Strasburg, pref. iv.
Subject-object, xcv.
Subjective order, lxxv., xci.; subject, xciii.

Subjectivism, lxxxv.
Substance, lxxxv.
Substratum, transcendental, lxxxvi.
Subsumption, lxxxi.
Supreme understanding, lxxxvi.; Being, lxxxvii., 79, 104.
Synthesis, xcv., lxxvi.; synthetic propositions, lxxvii.
System, lxxvii.
Système du Monde, ciii.

T

Teske, Prof. J. G., xix., xxi.
Theist, lxxiii.; theism, 105.
Theology, xvi., lxxv., 133.
'Theorie des Himmels,' ciii.
'Theory of Jurisprudence,' lii.
Thesis and antithesis, 87, 88.
Theuerin, Frau, lxii.
Thing-in-itself, lxxiv., lxxxii., –iii., –iv., –vii., –viii., –ix., xciv., –vii., –viii., 28, 33, 41, 55.
Thought, lxxxi., xc.; 'post-Kantian,' ciii.; pure, 5.
Time, lxxx., –iv., xciii., 29.
Transcendental Table of the Conceptions of the Understanding, 50; transcendental portion of metaphysics, 140.
Transfigured reality, cii.

U

Ueberweg, lxxxvii.
Unconditioned, lxxxii.
Understanding, lxxx., –i, 13; pure, 124, 133.
United States, ciii.
Universalia, ante res, post res, in rebus, lxxx.
Universality, logical and physical, 152.
Unknowable, xcix.
Uranus, civ.

V

Vacuum mundanum, extramundanum, dissemiuatum and coaeervatum, 243.
Vaihinger, Dr., pref. iv.
Void, 210.
Volkelt, lxxxviii.
Voltaire, lxviii.
Vorstellung, pref. iv.

W

Wasianski, lv., –vi., –vii., –viii., lx., pref. vii.
Welt als Wille und Vorstellung, eviii.
Wieland, lxv.
Will, lxxxvii., xeviii.
Wissenschaftslehre, ci.
Wolff, lxxiii., –iv., –v., 16, 126.
Wundt, xcix.
Wurtz, Prof., pref. iii.

X

X, lxxxvii.

Z

Zedlitz, Baron von, xxx.
'Zoonomia, or the laws of organic life,' cv.
Zoophyte, xcv.

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